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SOME FEATURES OF THE PHYSIOGRAPHY AND VEGETATION OF THE ALGERIAN SAHARA

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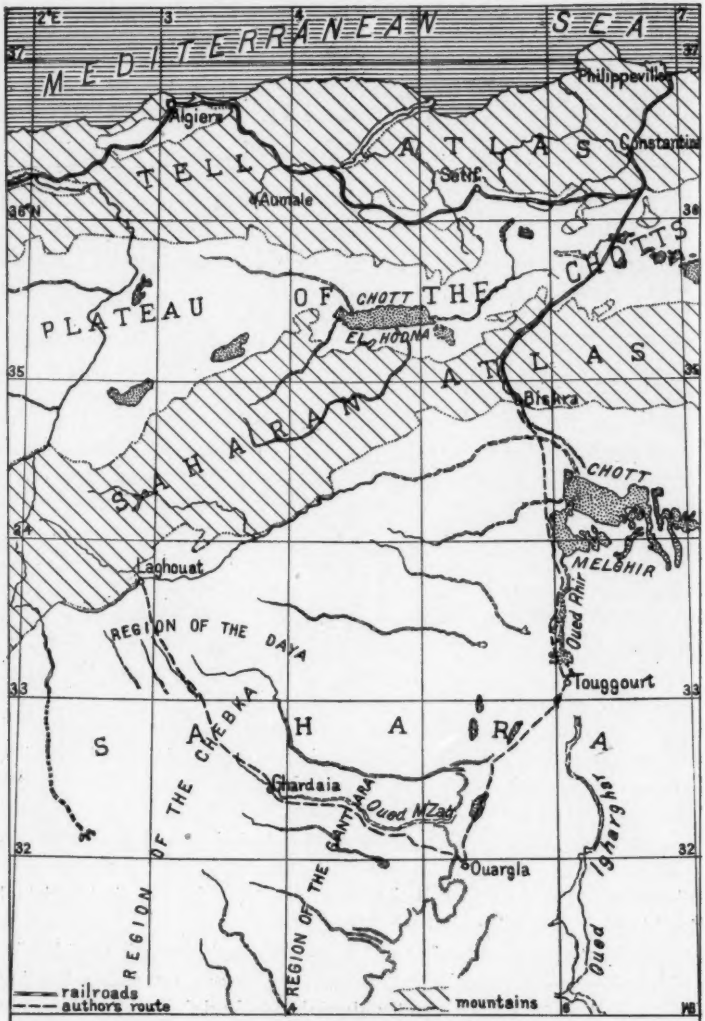
As a person crosses that portion of Algeria which lies south of the Sahara Atlas Mountains he is struck with the variety of the topographical features of the country, on the one hand, and the sparseness or the plentifulness, as the case may be, of the native flora, on the other, nor, unless a trained student of the desert, is he likely to see that there is any causal relationship between the two. The region to which reference is made, which was visited by the writer in 1910–1911, extends southward from Laghouat* to the M'Zab, of which Ghardaia is the chief town, thence south of east to Ouargla, and thence north to Biskra *via* Touggourt and the Oued Rhir (cf. the map on p. 482).

The Algerian Sahara is divided naturally into large regions, and the basis for the division lies mainly in differences in physiography. There also are minor divisions, founded on soil and surface variations, which may or may not coincide with the limits of the larger regions. Since the Arab, who made these distinctions, is a keen observer of the face of nature, which is usually of vital importance to him, the differences in soil, surface, and topography distinguished by him are generally well grounded.

At least three types of desert are recognized in southern Algeria, which are the *hamada,* or stony desert, the *aureg* or *erg,* the æolian (sandy) desert, and the *reg,* the fluvial, or alluvial desert. There are in addition the *chott,** or salt spot, which may be of large size, the *daya,* or oasis without constant water supply, and which has no surface drainage. The soil of the daya, in distinction to that of the

* The French transliteration of Arabic names used by the author has been retained throughout. —ED.


MEDITERRANEAN SEA
Philippeville
Algiers
TELL ATLAS
Constantine
Setif
Aumale
PLATEAU OF THE SAHARAN ATLAS
CHOTTS
CHOTT EL HODNA
Biskra
CHOTT MELGHIR
Laghouat
REGION OF THE DAYA
Oued Rhir
Touggourt
SAHARA
Ghardaia
Oued M'Zab
Oued Igharghar
Ouargla
REGION OF THE CHEBKA
REGION OF THE GANTARA
railroads
authors route
mountains
SKETCH MAP OF
THE ALGERIAN SAHARA
SHOWING
DR. W.A. CANNON'S ROUTE IN 1910-11
Scale 1: 4 600 000

chott, however, does not carry an excess of salts. The *oueds,* or arroyos, may be mentioned also since they have distinctive soils as well as characteristic vegetation.

The larger regions are those of the Daya, the Chebka, the Gantara, and the Erg. Some of the general topographical characteristics of each of these regions, together with a few comments on the most noticeable floral features of each, will be given in the following paragraphs.[1]

Leaving Laghouat and the Atlas Mountains behind, the traveler enters at once a gently rolling country which is the Region of the Daya. Here the low hills support a scanty population of small shrubs, but, from the hollows (dayas), there appear the crowns of well-formed trees. A superficial examination of the surface shows a marked difference between the dayas and the upland surrounding them. As has been remarked above, the dayas are separate from each other, having no surface drainage. The surface soil of the dayas is usually fine, containing an admixture of some sand. Stones are absent. The depth of the soil, also, is apparently considerable, although no exact measurements were made. On the higher ground, between the dayas, the soil and the surface are quite different from what is to be seen in the dayas themselves. Here sharply angular stones lie fairly thickly on the ground, and, where the infrequent rains have washed the superficial soils away, a light-colored and hard stratum, similar in appearance to the *caliche* of the southwestern United States, is exposed. It is apparent that the entire upland of the Daya Region is underlaid by this impervious hardpan, which has a marked influence on the composition of the flora.

The meager flora of the more elevated portion of the region has already been mentioned. It will be instructive to glance at the vegetation of the depressions. There are two perennials especially characteristic of the dayas, which are the betoum (*Pistacia*) and the jujube (*Zizyphus*). The former is a tree and the latter is a shrub. Both of these forms are fitted by root habit to live where the soil is deep, and neither can live where it is shallow. This is in part owing to the relatively large water requirement of the species, and, in part, to the root-systems which are incapable of great variation away from type. In addition to such limitations placed on the distribution, there is also an intimate relation of life-habit of the two forms, which operates to restrict the distribution of one of them. The relation, briefly stated, is as follows: The foliage of the be-

[1] A more complete account will appear in "Botanical Features of the Algerian Sahara," Carnegie Institution of Washington. In press.

toum is abundant and greedily sought by all herbivorous animals. Spines are wholly absent. It is only the adult plant, or, at any rate, the plant so high as to have its crown beyond the reach of animals, wild as well as domestic, that can successfully withstand their attacks. The young betoum would never survive were it not for the fact that it is always protected by another species, which is not eaten by animals; such a protector in the present case is the jujube. This shrub has small, leathery leaves and, moreover, is well provided with stout and sharp pines. When seeds of the betoum fall within the jujube's extending branches, they may sprout and grow to become fairly large trees before being discovered. When this occurs, if the jujube is sufficiently large so as to repel the animals, or if the young tree itself is of good size, its survival is assured. So important is the relation sketched to the betoum that that species does not occur in dayas where its nurse is not also to be found, and, also, its distribution throughout the region is strictly conditioned on the parallel distribution of the jujube.

Continuing south through the Region of the Daya, the Chebka is reached, where the topography undergoes a marked change. In place of the monotonous and undulating plain without well-developed drainage, which characterizes the Daya Region, oueds are encountered and low mountains, flat-topped, running in various directions. The rather confused topography of the region suggests, in bird's-eye view, a net, hence the name, Chebka. As the southern portion of the Chebka is approached the valleys are seen to become continuously wider until, near Ghardaia, they constitute the larger part of the surface. Here the physiography is a resemblance, in miniature, of the mesas and mountains of southern Arizona.

The flora of the Chebka is less diversified than that of the Daya and less rich. A casual view of the broad valleys, really hamada, does not reveal the presence of any plant, but instead a gray-brown expanse, with stones and even boulders covering the surface. In slight depressions, or in larger drainage channels, however, where there is a greater accumulation of earth, grasses, dry and brown most of the year, and small shrubs are to be found. A careful examination of the other portions of the hamada, where the available soil is very shallow and is underlaid by an impervious substratum, as in the Daya Region, shows that here also a few plants are able to survive. Such an area is figured in detail in Figure 11, which shows the character of the species, mainly *Haloxylon* and a few grasses. The number as well as position of the plants of the area are shown in Figure 9, a map of the area photographed. The

FIG. 1—*Reg* desert, 140 kilometers north of Ouargla. At the place a light covering of sand provides a mulch which operates to prevent rapid drying of the underlying soil.

FIG. 2—A new garden on the *reg* desert, 32 kilometers north of Ouargla. Here the soil is deep and fine grained, and the water from which the garden is irrigated is not over 1 meter beneath the surface.

FIG. 3—The corner of a garden at Ghardaia where barley is raised. The Barbary fig, shown in the middle ground, does not escape from the irrigated land, owing to the extreme dryness of the natural soil. It is not the extreme type of a desert plant.

FIG. 4—An irrigating ditch at Ghardaia. Water is drawn from wells in skin buckets and stored in plastered cisterns, from which it is distributed by such laterals as shown in this figure.

FIG. 5—View in the Region of the Chebka near Ghardaia. The broad plain is really a *hamada* desert, characterized by thin soil, which is underlaid by hardpan, and sparse vegetation. Of the different physiographic divisions of southern Algeria, the *hamada* is the most arid. It is the desert *par excellence*.

FIG. 6—A corner of an Arab cemetery at Ghardaia. The small shrub among the rough headstones is *Haloxylon*, an unarmed species, but widely distributed through southern Algeria. It is much sought after by all herbivorous animals as a food.

FIG. 7—View in a *daya* south of Laghouat. The trees shown are native species of *Pistacia* which have grown without irrigation, although the rainfall is less than 8 inches annually.

FIG. 8—The jujube (*Zizyphus*) in a *daya* south of Laghoua.. This species serves as nurse to the tree (*Pistacia*) shown in the background, protecting it when young against the attacks of animals. The local distribution of the *Pistacia* is conditioned on that of the jujube, as survival independent of it is impossible.

square in question, 50 by 50 feet, was selected as representing the richest flora of the hamada. Through the center of it runs a depression, possibly 6 inches lower than the sides of the square, where the earth has lodged, and where water from the infrequent rains courses. The sides of the figure represent the average condition on the hamada. It is interesting to note that the dominant species on the area, *Haloxylon,* is eaten by animals, and that in

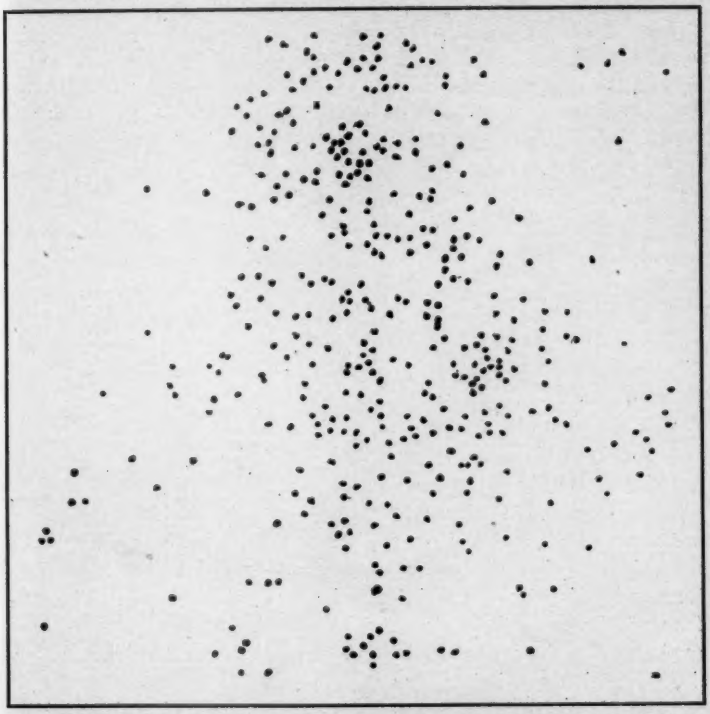


FIG. 9—Diagram showing the number and the position of the plants in an area 50 feet square in the *hamada* near Ghardaia. Each dot represents a living perennial.

spite of this fact it is one of the most widely distributed species in the northern Sahara. Several thousand sheep, goats, camels, as well as the wild gazelle, find all or most of their living on such pastures as is shown in the plate.

There is an important oued at Ghardaia, the Oued M'Zab, which is only mentioned here to point to the differences in soil conditions and plant inhabitants which distinguish the flood-plain of

the oued from the same features on the neighboring hamada. The soil of the Oued M'Zab valley is extremely variable. Close to the oued it is sandy at the surface and gravelly beneath. Near the valley sides the surface soil is fine clay with an admixture of sand. A hardpan in places comes within 3 or 4 inches of the surface, and in places crops out. Here the natives thresh the small amount of barley they are able to grow in their diminutive fields. In places, however, the fine soil is deeper, and the hardpan is either absent, or a considerable distance beneath the surface. In certain areas sand is strewn over the valley, either as a fine mulch, or as rather low dunes. Such being in brief the most striking soil conditions of the valley, the plants may be as briefly characterized. Along the oued occurs *Tamarix*—this species being met in no other place. Where the superficial soil is most shallow, either there are no plants at all, or *Haloxylon* is the leading species, if not the only one. Where the soil is either fairly deep, or is covered with a mulch of sand, other species than those mentioned occur in fair profusion.

Upon leaving Ghardaia and the Chebka the physiography of the country undergoes, quickly and strikingly, another change. The broad valleys with low mountains, characteristic, as we have seen, of the southern portion of the Chebka, give way, and there begins a wide plain broken by no heights and crossed by no important oueds, which, apparently quite flat, is, in reality, slightly undulating. This is the hamada *par excellence*, the Gantara. The surface recalls that of the Daya Region, save that the elevations are not so high and the depressions not so large or so deep. It, thus, is a region of rather shallow and small hollows, possibly formed by air currents mainly, which are not confluent. The surface of the ground is strewn with angular stones, and the soil available for the roots of plants is very thin. A hardpan underlies the region and is in places exposed.

The plant life of the Gantara is very sparse, being, if possible, more meager than that of the Chebka. Neither the hollows nor the more elevated areas are favorable for the presence of much vegetation. In certain areas, however, as midway between Ghardaia and Ouargla, where the surface is fairly level, there are a larger number of perennials than a hasty glance would suggest. For example, on an area 50 feet square, 389 living perennials were counted, all of which were small. The explanation of the paradox, a large population because of the poor water supply, is to be found in the dwarfing effect of the arid climate by which a small demand

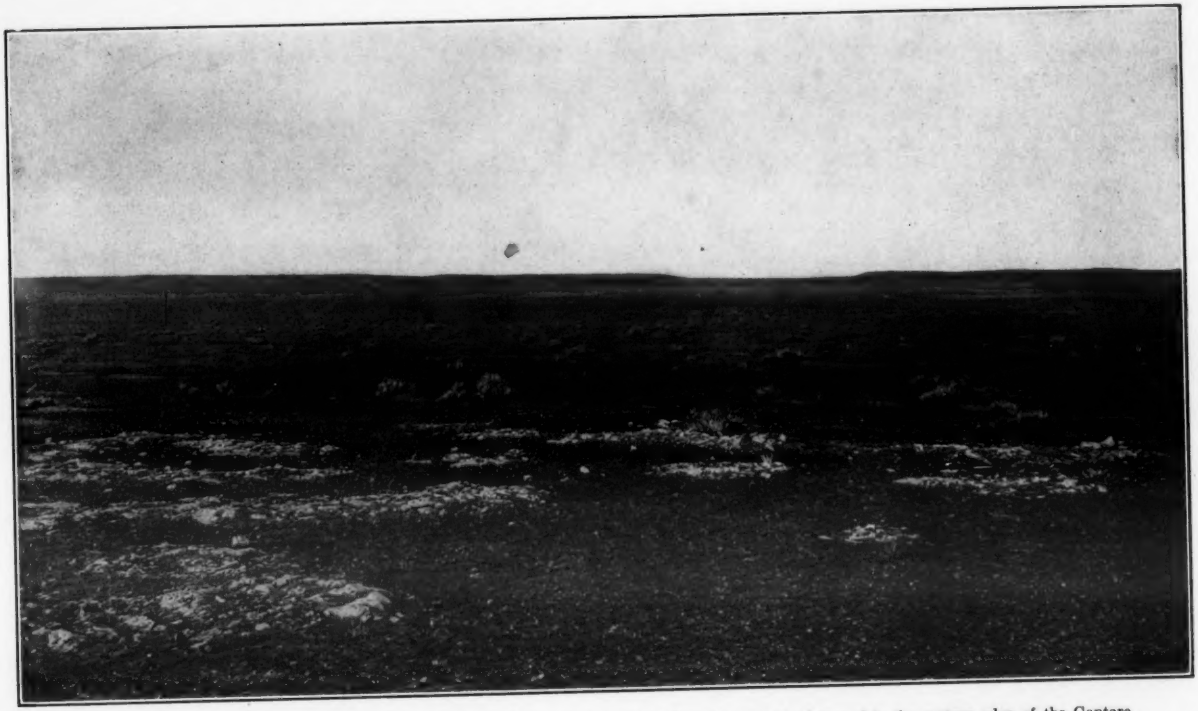


FIG. 10—Looking toward the *reg* desert, shown in the middle ground, north of Ouargla. The background is the eastern edge of the Gantara.

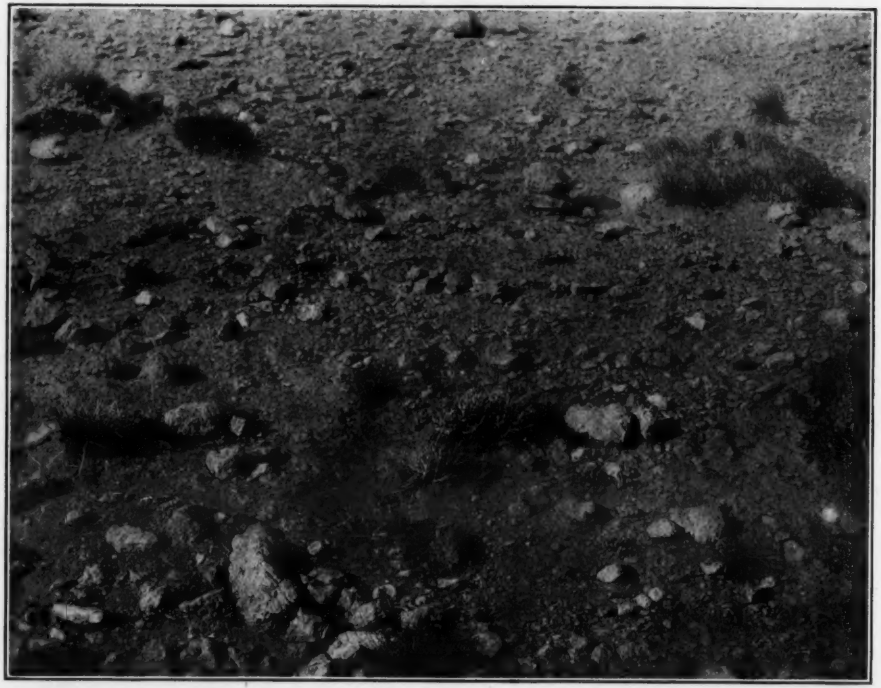


FIG. 11—View, showing detail, in the square on the *hamada* near Ghardaia. The number and distribution of the plants of the area are given in the text figure. The largest shrub is *Haloxylon*. Grasses are also present.

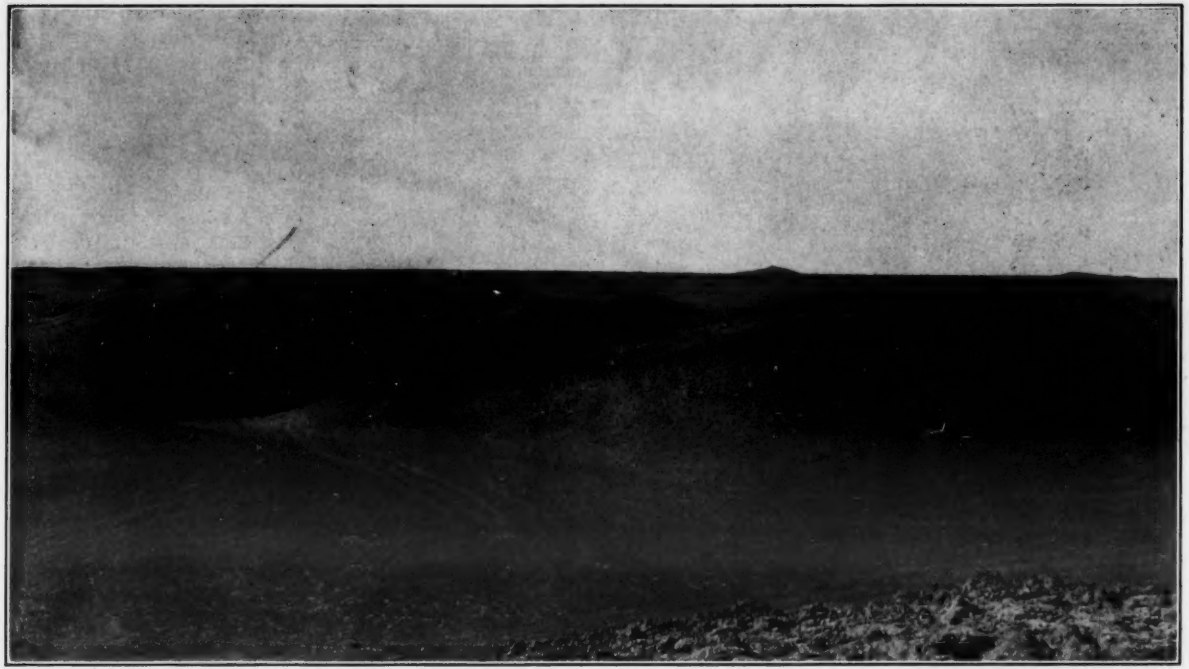


FIG. 12—*Mamelons* approaching Chott Mellala near Ouargla. The high sand hills in the *chott* appear on the horizon. The *mamelons* are largely the result of wind erosion.

FIG. 13—Detail of the surface on the northern edge of the Gantara. The most southern mountains of the Chebka are shown in the background. Camel trails, the only "roads" connecting Ghardaia, Ouargla and Touggourt, are seen crossing the middle ground.

is made for root room and for water. Where the soil is deeper, the same shrubs are larger, and, therefore, the population is less.

We crossed on the Gantara two barren zones, where, so far as we could determine from inspection, the surface and soil were similar to the surface and soil of the square above mentioned. Not a plant could be found, however, and it was apparent that on these zones less water had fallen than on the other area referred to. We were unable to find any reason for the condition observed.

Two chotts were crossed in the Gantara, of which one is about 10 kilometers wide. This, the Chott Mellala, is flooded at rare intervals. There are no plants in the central portion of the chott, but salt-resistant species, such as *Ephedra* and forms that are marked halophytes, occur on the borders. Along the eastern side lies a chain of dunes, which are said to be the highest in Algeria, 750 feet high. The wind-blown and sharp ridges support no plants, but toward the base occurs a sparse population of such perennials, like *Tamarisk, Ephedra* and " drinn " (*Aristida pungens*), which inhabit similar areas in other portions of southern Algeria.

The floor of the chott mentioned above, as well as the general level of the Ouargla plain, is about 180 feet lower than the Gantara. The dividing zone consists of points which project from the Gantara, or of isolated hills, whose connection with the Gantara has been lost. The hills are conical in form, *mamelons*, and show the effect of wind action. Characteristic *mamelons* situated on the western side of the Chott Melalla are shown in Figure 12.

East of both the Daya and the Chebka Regions is a region lower in altitude, some of it being, in fact, below sea level, which is a mingling of several physiographical features, and which is not designated by a name. Generally speaking, it is directly, or indirectly, connected with the drainage system of the Oued Igharghar, which takes its origin about 900 miles south in the Ahaggar Plateau (23° N.) and is the most important oued in the western part of the Sahara. Ouargla, Touggourt and the Oued Rhir, all celebrated for fine dates, are situated in the Igharghar drainage. To the east of these localities and oases lies a vast sandy desert only the edges of which are seen by the traveler in going northward from Ouargla. The northern extension of the Igharghar consists of immense chotts. Besides these physiographic areas there is that of the flats along the oued, or forming a portion of the oued, and which constitute a reg desert. There should be mentioned also the occasional approach of the hamada on the eastern side of the

reg, and this, as well as the reg also, is in places covered by large dunes or, at least, by drifting sand.

One of the characters of the Daya and the Chebka which has not been mentioned is the great depth to a perennial supply of water. On the hamada water has never been found, and in the dayas it lies from 100 to about 400 feet deep. In the valley of the Oued M'Zab at Ghardaia, the water is usually more than 50 feet beneath the surface. In these instances the water is too deep to be reached by the roots of plants and, therefore, does not influence the character of the vegetation. But in the reg desert to the north of Ouargla, as well as near that oasis, the upper level of the ground-water often lies within 3 feet of the surface. Where the ground is more elevated the depth, naturally, is more than this. The water, however, is highly charged with salts, but is consumed by animals as well as by the Arabs. Plants, therefore, that can endure such salts as the water carries have an abundant water supply. It is not surprising as a consequence that the reg, with deep soil and much water, has a fairly rich flora. Nowhere, indeed, can there be a better demonstration of the direct influence of abundant and available water supplied to the roots, although the rainfall of the region and other factors making for aridity unite to make it one of the most arid regions conceivable. As soon, however, as one retreats from the reg to the hamada, where the soil conditions and the water relations also are quite different, plants are almost wholly wanting.

A similar contrast is to be found in the vicinity of Biskra, although, owing to a fairly large rainfall in the Biskra region, the flora is not so meager as farther to the south.

In the Algerian Sahara, as indeed in other arid regions, there is a very close association between the character of the flora and the nature of the soils, especially their depth. Aside from the amount of annual precipitation there is probably no factor influencing the natural vegetation as important as this one. Thus in the present paper it has repeatedly been shown that, given two areas with the same rainfall, the one with shallow and the other with deep soil, the latter area has the richer flora, and the kinds of plants which occupy the two areas are usually unlike. Taking up the last condition first, it is found that such plants as have roots capable of variation away from type, or such as have a widely reaching root-system, are to be found where the soil is most shallow, while, on the other hand, plants with deeply penetrating roots, incapable of great variation away from type, or such as can

accommodate themselves to deep soil, occur on areas where the soil available for roots is actually or relatively deep. Finally, the sparseness of plants on the hamada is associated with the wide extent of the root-systems by which neighboring plants compete for the water. In certain instances, however, as on the Gantara, where the soil is shallow and the climate intensely arid, the shoots are dwarfed, and probably the root-systems as well, so that more individuals can occupy a given area than otherwise would be the case. This is one of the oddest paradoxes to be met in the desert, that the number of individuals is increased because the soil is shallow and the climate arid.

GEOGRAPHICAL INFLUENCES IN THE DEVELOPMENT OF WISCONSIN*

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CHAPTER II. THE FUR TRADE

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Its location between Lake Michigan on the east, Lake Superior on the north, and the Mississippi and St. Croix Rivers on the west, gives Wisconsin a boundary of over 700 miles of navigable waters, and a direct water connection with the Atlantic and with the Gulf of Mexico.

Lake Michigan is connected with the Mississippi by the Fox-Wisconsin water-route. The portages along this line, of which the longest and most difficult is one of a mile and a half at Portage, are short and easy. For a long time this was the most important and most traveled path between these two bodies of water. From Lake Superior the easiest and the most used route to the Mississippi was up the Bois Brulé, from the head waters of which there is a short portage to the tributaries of the St. Croix. There are other routes in the northern part of the state between the Great Lakes and Mississippi systems, but they were used less and are historically less important.

The surface of Wisconsin is dotted by many small lakes and cut by innumerable streams. Before the advent of the white man

* Continued from the June *Bulletin*, pp. 401–412.

these waters were alive with fish, and the land supported a multitude of fur-bearing animals. The beaver, otter, fisher, marten, mink, and muskrat lived in or near the streams and lakes; the deer, bear, wolf, fox, lynx, badger, raccoon, and skunk were confined to the land and were distributed in accordance with the food supply. The fish, game, wild fruit, and rice, together with such crops as the soil yielded to the crude agricultural methods of the savages, gave sustenance to a rather large Indian population.

Considerations of food supply, means of transportation, and of defense in time of war, caused the principal Indian villages to be located at such key points as portages, the mouths of rivers, and on important lakes and bays. "North American savages were keen traders; in intervals between warfare they held markets with their neighbors, at certain well-known rendezvous (like Mackinac, Green Bay, or Prairie du Chien), for the exchange of tribal specialties and of curiosities from a distance."[1] The Indians often traveled considerable distances for this purpose. The Sioux and Illinois Indians came in "dugout" canoes by way of the Mississippi, Wisconsin, and Fox Rivers to Green Bay, where they traded with the Winnebago. The western Indians brought information of the Mississippi River. The French heard of it as the "great water," the search for which first brought them to Wisconsin.

The rivers controlled not only the location of most of the villages and markets of the Indians, but to a certain extent their migrations. The Winnebago tribe occupied a palisaded fort on the high, east bluff of Green Bay, in such a position as to command the Great Lakes terminus of the Fox-Wisconsin water-route. They were a foreign tribe in this Algonkin territory, an outcast and somewhat degenerate branch of the Dakota linguistic stock, and are supposed to have migrated from Winnipeg to the shores of Green Bay by way of the Mississippi River and the Fox-Wisconsin route.[2] This is the first known of the many migrations along this waterway, and in time it became one of the most important migratory routes in the country.

Into this country of lakes and rivers, teeming with fur-bearing animals, came the first Frenchmen in 1634. After Nicolet's visit there are no recorded explorations of the state until 1655, when Radisson and Groseilliers followed Nicolet's path up the Fox River and on to the Mississippi. The exploration of Wisconsin, and of the interior of the country in general, was actuated by a variety

[1] Thwaites, R. G.: Wisconsin, p. 12. [2] *Ibid.*, p. 17.

of motives. There was always the hope of a route to India. The pieces of copper ore that got into the hands of the French led to a search for mines. But the greatest inducements were the remunerative fur trade and the wild, free life that went with it. "So powerful was the combined influence of these far-reaching rivers, and the 'hardy, adventurous, lawless, fascinating fur trade,' that the scanty population of Canada was irresistibly drawn from agricultural settlements into the interminable recesses of the continent."[3]

The early exploration of Wisconsin, as of any other wilderness, was by its waterways. Radisson and Groseilliers spent the summer of 1659 in trading with the savages on the streams in the vicinity of Chequamegon Bay. During the winter of 1659–60 they went into the interior "about the headwaters of the Chippewa, . . . penetrating as far west as the Sioux camps stretched along the upper reaches of the Mississippi,"[4] where spring found them. In 1660 Father Ménard lost his life in an effort to go to the headwaters of the Black River from Lake Superior by way of Lake Vieux Desert and the Wisconsin River. Thirteen years later Marquette and Joliet crossed the state in canoes by the Fox and Wisconsin Rivers and returned to Green Bay along the Wisconsin shore of Lake Michigan. When Duluth rescued Father Hennepin and his party from the Sioux in northwestern Wisconsin, he took them to Mackinac by way of the Mississippi, Wisconsin, and Fox Rivers.

The missionary followed the fur trader into Wisconsin and assisted in its exploration. "It is not true that 'not a cape was turned, not a mission founded, not a settlement begun, but a Jesuit led the way.' In fact, the Jesuits followed the traders, their missions were on the sites of the trading posts, and they themselves often traded."[5] The trading posts and missions were located at the important Indian villages, which were situated along the stream courses where beaver, otter, mink, and other fur-bearing animals were apt to be found. Father Claude Allouez established a mission at Chequamegon Bay in 1665, and later at the De Pere Rapids on the Lower Fox, near the present site of Berlin on the Upper Fox, and of New London on the Wolf. Mackinac was the great western supply station for the *coureurs de bois*. Its importance lay in the strength of its geographical location, which gave it control of the straits between Lake Michigan and Lake Huron and of the route between Lake Huron and Lake Superior. To Mackinac went most

[3] Turner, F. J.: The Indian Trade in Wisconsin, *Johns Hopkins Univ. Studies in Hist. and Polit. Sci.*, 9th Series, 1891, No. XI–XII, p. 22.

[4] Thwaites, R. G.: Wisconsin, p. 43.

[5] Turner, F. J.: *op. cit.*, p. 28.

of the furs collected west of Lake Michigan and north of Illinois, and from Mackinac the goods for the Indian trade were shipped to the posts in this region. By 1685 the English traders had reached this point and were received cordially by the Indians because of their cheaper goods. The French goods were unable to compete successfully with the English stock in part because of the greater cost of transportation incurred by the French in bringing their goods from Montreal over the Ottawa–Lake Nipissing–Georgian Bay route, with its many portages. The English goods were taken through the Mohawk depression by the Iroquois and then up the Lakes—a shorter and easier route. The French, being greatly alarmed at the attitude of the Indians, began to place trading posts among them in order to hold their allegiance. Stockaded posts were erected at the key points where, as already indicated, there were usually Indian villages. Besides the fort at Green Bay there was Fort St. Antoine on Lake Pepin, Fort St. Nicholas at the mouth of the Wisconsin, a fort at Trempealeau, and a post where, for a time, Perrot worked the lead mines above the Des Moines River.[6] In 1693 a fort was established on Madeline Island in Chequamegon Bay and another one on the Mississippi, eight miles below the mouth of the St. Croix, "to keep open for French trade, as against possible raids by the now rebellious Fox Indians, the Bois-Brulé–St. Croix route."[7]

At this time the Fox River was in control of the Fox Indians, who were a haughty, ungovernable, warlike people. The origin of the hatred which this tribe manifested towards the French is difficult to determine, but it is probably due to a series of events rather than to any one thing. Among the French there were doubtless some traders who did not deal honorably with the Indians, thus bringing all the French into more or less disrepute with the savages. The Foxes were almost continually at war with the Sioux, with whom the French traded, carrying to them by way of the Fox River the fire arms which they used against the Fox warriors. As a result of this long continued friction between these savages and the French, the former endeavored to interrupt the French trade by levying toll. The rupture became very serious when in 1687 the Jesuit mission at De Pere was burned by the Foxes,[8] forcing the missionaries to retreat to Mackinac. Somewhat later than this the Fox-Wisconsin waterway was made unsafe even for armed traders.

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[6] Turner, F. J.: The Indian Trade in Wisconsin, *Johns Hopkins Univ. Studies in Hist. and Polit. Sci.*, 9th Series, 1891, No. XI–XII, p. 33.

[7] Thwaites, R. G.: Wisconsin, p. 78.

[8] *Ibid.*, p. 91.

The English traders had not neglected their opportunities, and by 1700 the fur trade had assumed considerable proportions and was esteemed a very desirable thing by the colonists. In 1721 Governor Keith of Pennsylvania sent a petition to London asking the authorities to " 'fortify the passes on the back of Virginia' and to build forts upon the Great Lakes, in order to 'interrupt the French communication from Quebec to the River Mississippi.' "[9]

Before 1700 the Fox-Wisconsin route was of great importance to the French because the routes connecting the Great Lakes with the Mississippi were closed to them as far west as Lake Michigan by the hostility of the Iroquois. Of the routes which were out of the reach of the Iroquois the Fox-Wisconsin was the most feasible, for, while the Fox had several rapids and falls, the portages were easy and the stretches of river between were not swift. The portage between the Fox and Wisconsin was low and short, and, during flood, canoes could pass directly from one river to the other. The Wisconsin River was swift, and the descent was rapid and easy. The Fox-Wisconsin route also led the French into some of the best fur-producing country in the Northwest. The return trip from the Mississippi to Lake Michigan was more apt to be made by the Illinois–Des Plaines route, for the slow, sluggish current of the Illinois River did not offer such resistance to upstream travel as did that of the Wisconsin. After the final defeat of the Fox Indians in 1732, the Fox-Wisconsin waterway was practically free from interference from the savages, and the fur trade revived in Green Bay. While the French had been gaining trade in the far Northwest and in the country west of Lake Michigan, the English had obtained the trade along the Ohio, and when, in order to regain their hold on the territory they had always regarded as theirs, the French opened hostilities with the English traders, "it was the Wisconsin trader, Charles de Langlade, with his Chippeway Indians, who in 1752 fell upon the English trading post at Pickawittany and destroyed the center of the English trade in the Ohio region."[10] The leaders in the war that ensued were French traders from Wisconsin and the Northwest. They, with their Indians, took a prominent part in almost every important battle between the French and English. They gave up their wilderness and their fur trade only after a bitter struggle.

When the English came into possession of New France they carried on the fur trade in practically the same way as the French

[9] Thwaites, R. G.: Wisconsin, p. 89.

[10] Turner, F. J.: The Indian Trade in Wisconsin, *Johns Hopkins Univ. Studies in Hist. and Polit. Sci.*, 9th Series, 1891, No. XI–XII, p. 41.

had. They employed French traders and voyageurs and reopened the old French posts of Green Bay, Chequamegon, and Mackinac. At Chequamegon the Indians had been so long without a trader that they were dressed in deer skins.[11] Although the treaty of 1783 provided for a withdrawal of the British from the Great Lakes country of the United States by June 1, 1796, the posts were in the hands of the British traders up to the end of the War of 1812. After the close of the war the American Fur Company was organized with headquarters at Mackinac Island. Under the United States law of 1816 neither foreign traders nor capital for the fur trade could be admitted into this territory, but the English traders evaded this law by employing Yankee clerks to whom the invoices were made out. By this means a number of Yankees came to Wisconsin.[12] In 1816 the American Fur Company fitted out from Mackinac 240 boats, each containing 4 to 6 hands and 2 traders. One of these traders was an American who was learning the business; the other was a Canadian who went along as a hand.[13]

In 1814 government trading posts were located at Green Bay and Prairie du Chien, and in 1816 these were garrisoned. The system of government trading posts was a failure. It had but small effect upon the trade while it was in operation, and it was discontinued in 1822.

The volume of the fur trade was undoubtedly large, although few definite statements as to amounts and values can be made. In 1754 the post at Green Bay received for the Indian trade thirteen canoes of goods annually, with a value of about $18,000. The commandant of the Department of the Bay was in partnership with the governor and intendant, and his share of the profits annually was about $3,000.[14] In 1791 the amount of furs collected at La Pointe was 20 bundles, each bundle valued at 40 pounds sterling.[15] In 1816 about 300 packs of furs were collected at Prairie du Chien, each package weighing 100 pounds and consisting mostly of fine furs.[16] In 1821 the American Fur Company sent goods valued at $15,000 to the Green Bay post, $25,000 worth of goods to Prairie du Chien, and $19,000 worth to the Lake Superior country. In 1822, the value of the outfits sent to the Lake Superior region was $19,000. "It has been established that about this time goods for the Indian

[11] Turner, F. J.: The Indian Trade in Wisconsin, *Johns Hopkins Univ. Studies in Hist. and Polit. Sci.*, 9th Series, 1891, No. XI–XII, p. 44.
[12] *Ibid.*, p. 58.
[13] Biddle, J. W.: Recollections of Green Bay in 1816–17, *Wis. Hist. Coll.*, Vol. I, p. 51.
[14] Turner, F. J.: *op. cit.*, p. 40.
[15] Neill, E. B.: History of the Ogibways, *Minn. Hist. Coll.*, Vol. V, p. 446.
[16] Lockwood, J. H.: Personal Narrative, *Wis. Hist. Coll.*, Vol. II, p. 131.

trade brought to Wisconsin annually amounted to not less than $75,000 in value." [17] About 2,000 Indian hunters exchanged furs for guns, ammunition, and supplies at the Wisconsin posts at this time. In 1836, long after the best days of the fur trade, the firm of Porlier and Grignon of Green Bay "shipped to the American Fur Company about 3,600 deer skins, 6,000 muskrats, 150 bears, 850 raccoons, besides beavers, otters, fishers, martens, lynxes, foxes, wolves, badgers, skunks, etc., amounting to over $6,000." [18]

The amount of goods that a hunter could get for his furs was relatively small because of the high prices placed upon his stock by the trader. At Mackinac, in 1831, the following prices were paid for prime skins: beaver, $5.00 per lb.; bear, $7.00 per skin; muskrat, 22 cents per skin; marten, $1.25 per skin; mink, 40 cents each; fishers, $1.50; lynx, $1.35; otter, $6.00. On the other hand, a three-point blanket or a gun cost $22.00; a gill of powder, a gill of shot, or 25 bullets, $5.00; a beaver trap, $6.60; a rat trap, $3.50.[19]

The following table [20] gives the prices of articles used in the fur trade and the net gain to the trader. The muskrat skin was used as the unit of trade.

St. Louis Prices.		*Minnesota Prices.*		*Net Gain.*
Three-point blanket	$3.25	60 rat skins at 20 cents	$12.00	$8.75
1½ yds. stroud	2.37	60 rat skins at 20 cents	12.00	9.63
1 N. W. gun	6.50	100 rat skins at 20 cents	20.00	13.50
1 lb. lead	.06	2 rat skins at 20 cents	.40	.34
1 lb. powder	.28	10 rat skins at 20 cents	2.00	1.72
1 tin kettle	2.50	60 rat skins at 20 cents	12.00	9.50
1 knife	.20	4 rat skins at 20 cents	.80	.60
1 lb. tobacco	.12	8 rat skins at 20 cents	1.60	1.48
1 looking glass	.04	4 rat skins at 20 cents	.80	.76
1½ yds. scarlet cloth	3.00	60 rat skins at 20 cents	12.00	9.00

The goods used in the Indian trade were blankets, coarse cloths, calicos, cheap jewelry, trinkets, fancy goods such as ribbons and shawls, kettles, knives, hatchets, guns, ammunition, tobacco, and intoxicating liquor. In the autumn these things were shipped from Mackinac in canoes or bateaux to the various posts in the interior. The hunter took his winter supply of goods, his stock of corn, beans, wild rice, and his family to his winter hunting grounds. The goods were sold on credit to be paid for in the spring with the furs collected. A book account was kept with each Indian. The amount for which a hunter was trusted varied with his reputation for honesty and his ability as a hunter. It was usually from $40 to $50; sometimes it ran as high as $300. The trader expected a gain of

[17] Legler, H. E.: Leading Events in Wisconsin History, p. 156.
[18] Turner, F. J.: *op. cit.*, p. 65.
[19] Sen. Doc. 90, 22d Cong., 1st Sess., p. 44.
[20] *Minn. Hist. Coll.*, Vol. II, p. 131.

100 per cent on the goods sold, and if half his credits were paid in the spring it was a good business. At first the unit of exchange was the beaver skin, or the "plus," which usually weighed 1½ pounds. If it weighed 2 pounds, allowance was made for it. When the beaver became scarce and the Indians sold their lands, money came into use, but the muskrat skin was also used as a unit late in the history of the trade.

During the winter, agents of the traders went among the hunters collecting furs and selling goods. The larger posts had smaller ones dependent on them, where goods were sold and furs collected. In the spring the hunters returned to the villages and paid for their goods with the winter harvest of furs. The squaws planted corn, beans, melons, and potatoes; the Indian hunted and fished and enjoyed himself. The trader returned to Mackinac with his cargo of furs, with which he paid for his winter stock of goods, and spent his surplus during the summer at his leisure.

The fur trade found the savages subsisting by hunting and agriculture, which held a larger part in their economy than it generally is supposed to have done. Gradually their manner of life was changed. The clay kettles, pots, and dishes were exchanged for copper and brass utensils; their weapons of stone and wood and bone—the spear, the knife, the bow and arrow—were replaced by the gun, steel knife, and tomahawk. Instead of hunting to provide food and clothing for themselves and their families, they killed indiscriminately, and soon so reduced the supply of fur-bearing animals that it became necessary to look for fresh fields. With their attention so centered on the hunt they gradually abandoned and finally forgot many of their primitive industries, which made them more dependent on the manufactured articles of the white people. The redistribution of the Indians, in the effort to secure good hunting grounds, caused intertribal wars in which the better armed tribes had the advantage. The unarmed tribes invited the traders to their territory, obtained fire arms, and became hunters in self-defense. The traders usually had a very strong influence with the savages and often appointed chiefs, irrespective of tribal organization, who would foster the fur trade. This was particularly true of the English and American traders, and it resulted in much trouble for the white men in dealing with the Indians, because the tribes were often without recognized heads. The purity of the race was destroyed by frequent intermarriages with the traders. There is scarcely a tribe in the Northwest that has not some intermixture of French and Anglo-Saxon blood. As the Indian system of cul-

ture became more and more demoralized by commercial intercourse with the white race, the savages became more and more dependent on the white people, and the conquest of the country was at the last relatively easy.

The fur trade necessitated a wandering life for those directly concerned in it and developed the distinct class of the *coureurs de bois*. They were for the most part "individuals of little or no education, but remarkable for their energy and fidelity to their engagements."[21] These men went into the wilderness about August or September with canoe loads of goods for the Indian trade. They returned in the spring to Mackinac, where they sold their furs, or, if they were clerks, they delivered the furs and received their salaries. The dealings of the trader with his principal were almost uniformly honest, but he had no scruples about taking any advantage, fair or unfair, of a competitor. In case of famine or sickness hostilities between rivals ceased and each gave the other all the assistance possible. Under similar circumstances the traders ministered to their Indians as long as their stores lasted and gained a tremendous influence over them. While this influence was sometimes used for selfish and unworthy purposes, it was used many times for the benefit of the savage. The freedom and independence of the life in the woods, without the restraints imposed by civilized society, bred a restlessness which did not allow a return to pursuits less exciting and less full of adventure. It sometimes bred also a looseness of personal and moral habits that made the voyageurs a not altogether desirable addition to a well-regulated community.

The profits of the fur trade made possible the exploration of the country. The early settlements and explorers were supported by supplies furnished by the Indians, and without these supplies many would have perished. Settlement was encouraged so long as it benefited the trade, and near each post there was a cultivated patch containing potatoes, corn, beans, and peas. When the fur trade became a thing of the past and the farmers were coming into the country, the traders changed their stock of goods, the post became a country store, and the nucleus of a pioneer settlement.[22] Most of the leading towns and cities of Wisconsin are situated on the sites of old trading posts, as for example, Milwaukee, Chippewa Falls, Oshkosh, Fond du Lac, La Crosse, Eau Claire, Madison, Sheboygan, Manitowoc, Two Rivers, Kewaunee, Green Bay, Prairie du Chien,

[21] Sibly, H. H.: Reminiscences, *Minn. Hist. Coll.*, Vol. I, p. 464.

[22] Turner, F. J.: The Indian Trade in Wisconsin, *Johns Hopkins Univ. Studies in Hist. and Polit. Sci.*, 9th Series, 1891, No. XI–XII, p. 67.

XUM

De Pere, Kaukauna, Neenah, Hudson, Portage, Menominee, Oconto, Peshtigo, Black River Falls, Rice Lake, Baraboo, Shullsburg.[23]

While the efforts of those interested in the trade were to discourage agricultural settlement, the reports of traders many times guided farmers to desirable parts of the state. The location of trading posts at carrying places around falls and rapids pointed out the water power of the state.

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[23] Thwaites, R. G.: The Story of Wisconsin, p. 160.

THE OHIO RIVER FLOODS OF 1913[1]

By ROBERT M. BROWN

State Normal School, Worcester, Mass.

The Storms of March 22–27, 1913, in Ohio. During the five days, March 22–27, 1913, an unprecedented rainfall over the state of Ohio added approximately 560,000,000,000 cubic feet of water to an area where the rivers were somewhat above the normal stage and where the ground, saturated from previous rains, yielded a

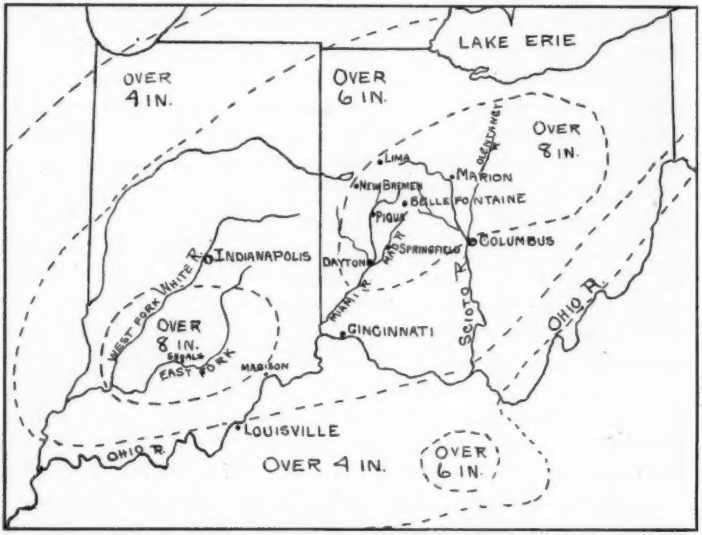


FIG. 1—Map of Ohio and Indiana, showing the amount of rainfall over the district during the passage of the two storms of March 22-27, 1913.

large percentage of run-off. This volume of water is equivalent to one thirty-sixth the average annual discharge of the Mississippi River, and eight basins as large as the Salt River reservoir would not be sufficient to impound the water.

A special bulletin[2] of the Weather Bureau shows that the al-

[1] The writer has made free use of the reports from the various districts by the local engineers, published in the *Engineering Record* and *Engineering News*. The rainfall data have in almost all cases been taken from the daily Weather Maps and the National Monthly Weather Bulletin of the Weather Bureau.

[2] U. S. Dept. of Agriculture Special Bulletin of the Storms of March 22–27, 1913 (published April 15, 1913).

most continuous rains of the five days were the resultant of two storms. The first of these, the tornadic storm of Omaha, Nebr., Terre Haute, Ind., and intermediate places, caused precipitation over Ohio during the 23d and 24th, which was excessive. In the Miami River water-shed the rainfall for the 23d at New Bremen was 2.06 inches, at Bellefontaine, 1.37 inches, and at Lima, 2.20 inches; for the 24th at New Bremen, 1.80 inches, at Bellefontaine, 1.52 inches, and at Lima, 1.34 inches, making for this storm at the three stations totals of 3.86 inches, 2.89 inches and 3.54 inches, respectively. Directly upon the rear of this storm from the west, so that the rainfall blended, a storm from the southwest added still heavier precipitation to the already flooded area. The precipitation for the 25th at New Bremen was 3.22 inches, at Bellefontaine, 5.61 inches, and at Lima, 3.35 inches, and, for the 26th, at New Bremen, 1.22 inches, Bellefontaine, 2.13 inches, and Lima, 0.62 inches. The heaviest rainfall reported for the two storms of five days' duration was at Bellefontaine, Ohio, a total of 11.16 inches; Marion, Ohio, reported 10.60 inches; Bangerville, Ohio, Madison and Shoals, both in Indiana, reported over 9 inches; and a large section of the state of Ohio, including all the water-shed drained by the Miami River, experienced over 8 inches. The heaviest rainfall for a single day was at Bellefontaine on the 25th, when 5.61 inches fell; on the same day at Marion 4.71 inches were reported.

The rainfall, in inches, for January, February and March, 1913, over the Ohio valley for three stations on the southern tributaries and three stations on the northern tributaries with three stations on the Lower Mississippi is shown in Table I.

TABLE I

	January		February		March	
	Normal	1913	Normal	1913	Normal	1913
Nashville, Tenn.	4.85	12.30	4.32	4.71	5.44	4.54
Lexington, Ky.	3.83	10.35	3.23	2.61	4.72	6.04
Louisville, Ky.	3.90	9.91	3.75	2.09	4.32	7.70
Cincinnati, O.	3.36	9.02	3.24	1.86	3.64	9.09
Dayton, O.	3.01	6.66	3.08	1.32	3.45	....
Columbus, O.	2.95	6.63	3.07	2.09	3.21	8.09
Memphis, Tenn.	5.21	7.70	4.35	5.23	5.77	4.78
Vicksburg, Miss.	5.67	7.00	4.61	7.31	6.25	6.70
New Orleans, La.	4.63	5.71	4.47	2.19	5.30	4.94

The rise of the Ohio and Mississippi Rivers in January is accounted for by the excess of rain over the Ohio basin. For the most part during February the rainfall was below the normal for many stations, and in no case did the rainfall for the month

greatly exceed the normal. Most of the excess of rain for March, 1913, can be accounted for by the two storms occurring between March 23d and 27th. Thus, at Cincinnati the total rainfall for the month of March was 9.09 inches while the four-day period, 24th to 27th inclusive, yielded 5.19 inches, and at Columbus the total for March and the amount of precipitation during the same four days read 8.09 inches and 6.94 inches, respectively. The daily rainfall for a number of stations is tabulated in Table II. The values are given in inches for the twenty-four hours ending at 8 a.m. on the dates which head the table.

TABLE II

	March 24	March 25	March 26	March 27	Total
Cincinnati, O.	0.40	2.24	1.75	0.80	5.19
Cleveland, O.	1.96	2.88	1.26	0.98	7.08
Columbus, O.	0.60	2.62	2.72	1.00	6.94
Dayton, O.	0.48	2.52	2.00	.40	5.40
Indianapolis, Ind.	1.52	3.40	0.46	....	....
Cairo, Ill.	0.72	1.56	2.72	0.26	5.26

Flood Conditions in Three Cities: (*a*) *Dayton, Ohio.* Dayton is situated on the Miami River. Within the city limits two large tributaries enter the Miami River, the Mad River and the Stillwater River, and these three streams have a drainage area of nearly 2,500 square miles. The Miami River is bordered on both sides by a flood-plain which is protected by levees. At least one-half of the city of Dayton is on this flood-plain, and the levees which protect this area have been built to withstand a stage of 23 feet. The record flood of the river previous to 1913 was in 1866, when the river reached a stage of 21.3 feet, so that the 23-foot stage was within the generally accepted limit for safety. The only odium which can be attached to the city site lies in the statement that the Miami, notwithstanding the addition of two large tributaries, flows in a narrower channel below the confluences than it does above, and also that the river makes a sharp bend within the city limits; both of these factors would tend to retard the excess discharge. A number of bridges cross the river, and the channel, which averages about 600 feet, was in some cases constricted at these points. None of these, however, can be considered other than aggravating conditions; the main cause of the damage was the rainfall much in excess of any within the experience of residents in the state.

The rise of the river began during the first of the two storms

and reached an ordinary flood proportion. For the two-day period ending March 24th the rainfall at Piqua on the Miami River reached 6.59 inches. The drainage of this excessive rainfall was causing a rising stage on the river when the second storm broke and exceeded the precipitation of the first. For the three-day period ending March 27th, Bellefontaine had a rainfall of 8.27 inches and Springfield on the Mad, 6.14 inches. The stage of the flood crest at Dayton was 29 feet, 6 feet above the top of the levees. The overflow began on the 25th, and the recession of the water began on the next day. The lower part of the city was,

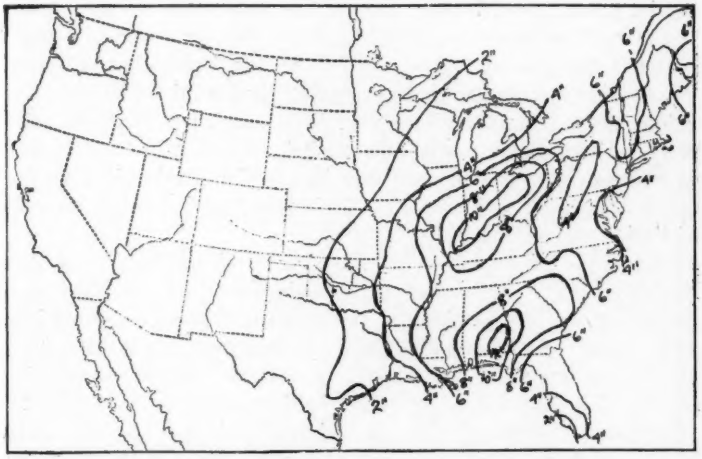


FIG. 2—Rainfall for March, 1913. From the U. S. National Monthly Weather Bulletin.

during the height of the flood, 10 feet under water. Nine breaks in the Mad River levee and the same number on the Miami River resulted. Of the six bridges across the Mad River but one was seriously damaged; the bridges over the Miami suffered more, one was carried away, two badly twisted and all more or less damaged. The loss in human life, while large, was not nearly so overwhelming as first reported and the property loss is conservatively estimated at $30,000,000.

(*b*) *Columbus, Ohio.* Columbus is situated at the confluence of the Upper Scioto and Olentangy (Whetstone) Rivers which have a combined drainage area of approximately 1,600 square miles. The flood-plains of these rivers within the city cover an area of about nine square miles, a part of which is densely populated.

The Scioto River winds through this flood-plain, making two sudden turns where the river impinges against the eastern bluffs. The populated portion of the city is protected by a levee which extends along the west bank of the river for a distance of seven miles. The highest flood in previous years was in 1898 with a gage height of 21.3 feet, and the levees had been extended to 6 feet above that mark. The Weather Bureau records give, for the maximum stage during 1913 on March 25th, 22.9 feet. The discrepancy between the height of the levees and the height of the flood during 1913 must be explained by the release of the water higher up the Scioto River after the overtopping of the levees, which caused a number of breaks, and by the position of the gage below the first of the sharp bends of the river where one or two bridges constrict the channel. The rainfall at the headwaters of these two streams was similar to that reported for the Miami River. The Scioto has a tributary rising near Bellefontaine so that the rainfall of 11.16 inches during the period from March 23d to 27th overlapped both drainage basins. In addition Marion had a rainfall for the same period of 10.71 inches, and at Columbus the precipitation was 6.97 inches.

As in the Dayton flood the damage to railroad lines was particularly heavy. The levees at Columbus were in part used as a track-way, and the breaking of the levees tore away many sections of the road. The Baltimore and Ohio Railroad in the Ohio flood district reports a loss of between $2,500,000 and $3,000,000, including the destruction of twelve bridges, and the "Big Four" (Cleveland, Cincinnati, Chicago and St. Louis Ry.) reports forty bridges destroyed and from twenty-five to thirty miles of tracks washed away.

The houses on the flood-plain area of Columbus were largely wooden structures, and in places the water reached above the second story. About 30,000 people were driven from these homes by the breaking of the levees, and eighty-five lives were reported lost. The estimate of damage made by the Columbus Building Department is 300 houses wholly destroyed, 200 houses badly damaged, and a loss of personal property, altogether aggregating $1,500,000.

(*c*) *Indianapolis, Indiana.* This city is situated at the confluence of the West Fork of the White River and Fall Creek. The story of the river and the location is similar to that of Dayton and Columbus. The river makes one or two sharp bends in the center of the city, and at one of these the channel is restricted by

the piers of bridges. It is, however, unjust to give as the cause of these floods this evidence of crowding the natural flow of the rivers when the rainfall easily explains the high stages. As in Ohio the ground in Indiana was saturated with moisture when the two storms of March 23-27 broke, and in consequence the percentage of run-off was high. At Indianapolis, for the twenty-four hours ending at 8 a.m. on the 23d, the precipitation was 0.16 inches, on the 24th, 1.52 inches, on the 25th, 3.40 inches and on the 26th, 0.46 inches.

On the 26th snow and sleet fell. Previously, on the 21st, 0.46 inches of rain had fallen. The region of the heaviest rainfall was

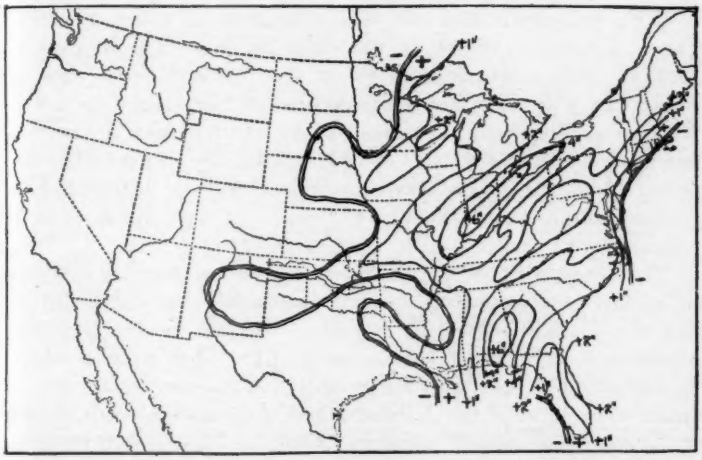


FIG. 3—Departures from the normal rainfall for March, 1913. From the U. S. National Monthly Weather Bulletin.

not, however, in the West Fork drainage basin but to the south of Indianapolis and over the East Fork basin. At Indianapolis the precipitation during March 23-27 was 5.54 inches with a total rainfall for the month of March of 7.76 inches, 3.75 inches above the normal for the month.

The highest stage of the river ever recorded previous to 1913 was during March, 1904, when the gage reading reached 21.3 feet. This year the river rose to 25.7 feet, 4.4 feet above the 1904 record.

The area flooded was a long narrow strip mostly on the west bank of the river and averaging about a mile and a quarter in width. The average depth of water over the flooded area was

from 10 to 12 feet, and many places had a much greater depth of water.

The damage has been estimated at $2,000,000 for property owners and industrial plants and at $1,000,000 for the railroads and public utilities. Here, as in many other places, the water supply and the sewage system were temporarily deranged. The water supply in Indianapolis was interrupted from noon on Tuesday until the morning of Friday. Railroads, which in many instances parallel the river and frequently cross it, lost heavily by the flooding of the road-bed and the damage to the bridges.

Two Floods at Pittsburg, Pa. During 1913, Pittsburg was visited by two floods which exceeded the 30-foot stage. The record flood for this city is 35.5 feet, which occurred on March 15, 1907. The danger line is 22 feet on the Pittsburg gage. On January 9, 1913, the gage height read 31.3 feet, and this is the first time on record that a January flood exceeded the 30-foot stage.

As is shown in Fig. 4, a much larger rainfall than the normal was experienced in western Pennsylvania for the month. The departure from the normal was above plus 2 inches. Pittsburg had a total rainfall for the month of January of 5.28 inches, with a normal of 2.87 inches.

The storm which caused the flood occurred on January 6-9, and an average precipitation of about 2 inches fell over the basins of the two main contributing streams. To the north over the Allegheny basin there was a snow cover of from 1 to 5 inches which the high temperatures accompanying the storm quickly turned to water. The crests of the Allegheny and Monongahela floods united at Pittsburg and caused 700 acres of the low land within the city limits to be submerged.

The second flood occurred on March 28, 1913, when a stage of 30.4 feet, 8.4 feet above the danger line, was reached. The storms which caused this flood were the storms which resulted in the heavy floods over Ohio and Indiana. For the days of the storm, March 24-28, the rainfall at Warren was 4.0 inches, Parker 4.9 inches (both in the Allegheny basin), and Pittsburg 3.3 inches. The Monongahela basin did not receive a heavy precipitation; this prevented the flood from being the record high water. The result of this flood in Pittsburg was the submerging of about 650 acres of city land to a depth of about eleven feet. One-half of this was settled by industrial plants, while another portion was made up of residential and mercantile sites. Altogether eight miles of railroad tracks were flooded.

Two floods of such heights in a single season is a new record for Pittsburg. During February and March, 1908, floods of 30.7 feet and 27.3 feet respectively were experienced, and this has been the record until the present year.

Stages on the Ohio River. The progress of the January and March floods down the Ohio and Mississippi was marked by unusually high stages, by the flooding of cities and, along the Mississippi River, by the breaching of the levees.

At Wheeling, West Virginia, 90 miles below Pittsburg, the first crest reached a stage of 44.6 feet on January 9th. This is 8.5

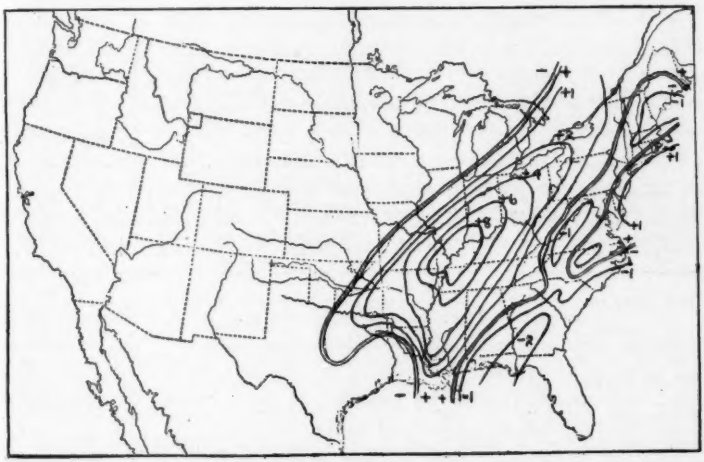


FIG. 4—Departures from the normal rainfall for January, 1913. From the U. S. National Monthly Weather Bulletin.

feet below the record flood which occurred during February, 1884, but it was 8.6 feet above the danger line. This flood drove 600 families from their homes. On March 28th, a stage of 51.1 feet was recorded, 2 feet below the record, and 6.5 feet above the January flood.

At Cincinnati, Ohio, 468 miles below Pittsburg, the danger line of 50 feet was crossed on January 10th; on the 11th the river went to 54 feet, when the Grand Central Station became useless; the crest passed on the 15th with a stage of 62.2 feet. The February, 1884, flood reached a height of 71.1 feet. During the January, 1913, flood, 3,000 families were driven from their homes, and an estimated loss of $2,000,000 has been given out by the city au-

thorities. The March flood of 1913 exceeded the January flood by 7.6 feet and lacked 1.3 feet of reaching the record stage.

The 1884 flood was of brief duration while the 1913 flood had a much flatter crest, and the high stage of 68 feet lasted at this city from Sunday, March 30th, until Thursday, April 3d, and the volume of water during this year's flood probably exceeded any other.

At Cairo the 1912 flood made a new record of 54 feet, which is 9 feet above the danger line. The March, 1913, flood exceeded this record by 0.7 feet, making the new record at Cairo of 54.7 feet.

TABLE III

STAGES OF THE OHIO RIVER (Elevations in Feet)

	Maximum Flood	Danger Line	1912	1913	
				Jan.	Mar.–Apr.
Pittsburg, Penn.	(1907) 35.5	22	28.1	31.3	30.4
Wheeling, W. Va.	(1884) 53.1	36	38.4	44.6	51.1
Cincinnati, O.	(1884) 71.1	50	53.4	62.2	69.8
Louisville, Ky.	(1884) 46.7	28	28.7	....	45.0
Cairo, Ill.	(1912) 54.0	45	54.0	....	54:7

Protection from Floods. Newspapers and magazines have been teeming with advice since the disaster in Ohio, and the consensus of opinion as expressed by many of the articles is that reservoirs and reforestation must be resorted to as a means of protection and also that the levees are not sufficient.

Notwithstanding, there is little doubt that the country is committed, and justly so, to a levee policy for the protection of the lowlands along the rivers. It will be necessary to build the grade of these levees higher and higher for a number of years unless some counteracting project, as large reservoirs, be built to lower the flood crest. It is doubtful if any of the remedial policies would have prevented damage during the recent floods. Reservoirs would have been full, forested areas would have been saturated before the heavy rainfall which caused the disaster broke over the area. The levees were sufficient for any known stages of the rivers, although some carelessness in the use of the levees and the treatment of the stream channels is charged against the railroads and municipalities. English engineers have advocated a policy of protection against the normal flood and have not considered it either profitable or desirable to build structures against an ab-

normally high stage. Under this heading fall the Ohio floods of March, 1913. They were the result of unprecedented rains. Shall the cities plan to raise the levees 2 to 3 feet above the newly established grade of an unusual flood? Shall reservoirs be constructed to hold the excess of water above the danger stage of the highest known flood? The engineers of the Mississippi River state that the Ohio, Upper Mississippi, and Missouri Rivers have never been known to have been in extreme flood simultaneously, and they assert it is unlikely that high stages of these three large feeders to the lower river should occur at the same time. Should such an event occur, the volume of water discharged to the Lower Mississippi would greatly exceed any anticipated stages of the river. Somewhat guardedly, perhaps, the possibility of such an occurrence is admitted. Shall the heights of the levees be adapted to withhold this possible volume of water? The policy of the Mississippi River Commission, although not stated in print, may be inferred from the projects to take no account of such a contingency, and, tacitly, at least, it stands for protection against normal or great floods but not against floods of unprecedented conditions. Some protective measures, however, should be adopted to prevent fatalities in unusual cases.

There is no excuse for loss of life in these floods. Because the Mississippi floods move over so great a distance, the crest height can be accurately predicted for many stations a few days in advance, and ample warning reaches every area of the alluvial basin. In recent years the death toll on the lower Mississippi has been a negligible quantity, and in most cases where a loss of life has been reported the cause can be traced only indirectly to the overflow. In the Ohio cities no such warning is possible, as the flood follows closely on the precipitation.

It will be a questionable policy, however, to permit the rebuilding of dwelling houses on the areas subject to overflow. City parks and playgrounds, storage house and mercantile plants are more fitted for the flood-plains bordering most rivers, and certainly it is as much a function if not a duty of municipal prudence to forbid its people to dwell in areas subject to overflow without warning as it is to protect them from violence or fire.

Again, it will not be possible to protect within any reasonable expenditure property from such unusual conditions as occurred in Ohio and Indiana. The risk and sometimes the destruction of property is the tax which must be paid for the occupation of many of these valuable sites.

THE TROUGHS OF THE WESTERN PACIFIC OCEAN

The new record sounding of 32,114 feet [1] in the central part of the Philippine Trough, which was reported in the *Bulletin* last year (Vol. 44, p. 611), leads Dr. W. Krebs, of the Meteorological Observatory of Schnelsen, near Hamburg, to discuss the troughs of the western Pacific in general and their structural significance (*Geogr. Zeitschrift*, Vol. 19, 1913, No. 3, pp. 161–163, and *Deutsche Rundschau für Geogr.*, Vol. 35, 1912–13, No. 3, pp. 123–124; both with maps).

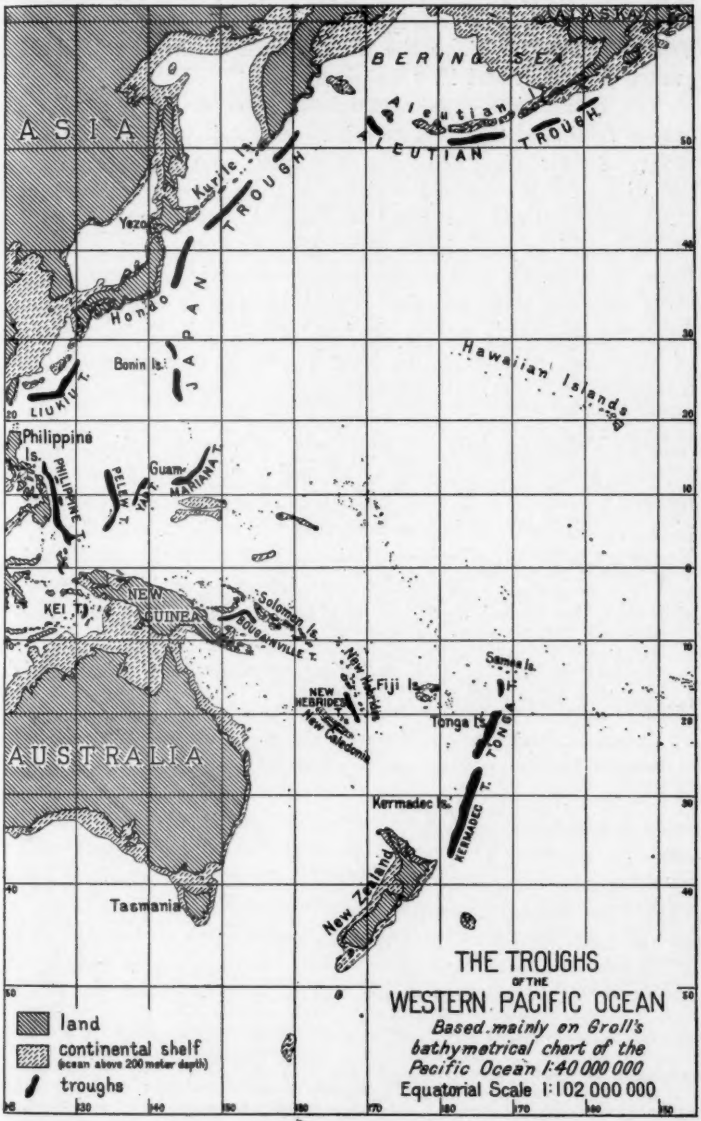
If, with Suess, we count Alaska as belonging structurally to Asia (*Bulletin*, Vol. 42, 1910, p. 179) we can distinguish no less than twelve troughs in the western (Asiatic) Pacific, which vary between 24,000 and 32,000 feet in depth. They may be considered to be aligned in two series, an outer and an inner one (with reference to Asia). With the exception of three they all lie on the convex side of the island festoons which border the eastern side of Asia.

To the outer series belong the following, beginning on the north (cf. the map): the Aleutian Trough, paralleling the Aleutian Islands on the south; the Japan Trough, which extends along the outer side of the Kuriles, of Yezo and Hondo, and of the Bonin Islands; the Mariana Trough, along the outer side of the southern end of the Mariana group (with the depth, southeast of Guam, of 31,614 feet sounded in 1899 by the U. S. S. *Nero*,[2] which, up to the record sounding in the Philippine Trough was the greatest known oceanic depth); the Yap Trough and the Pelew Trough, east of the islands of that name; and, at a long interval, the Tonga Trough and the Kermadec Trough, extending together for 1,500 miles along the eastern side of the islands of that name from Samoa to New Zealand.

The inner series of troughs consists of the following: the Liukiu Trough, along the outer side of the Liukiu Islands between Japan and Formosa; the Philippine Trough, skirting mainly the coast of Samar and Mindanao; then the three troughs which exceptionally lie on the concave side of the island arcs they accompany, *viz.*, the Kei Trough, on the inner side of the islands encircling the Banda Sea, the Bougainville Trough, along the south side of Neu Pommern

[1] 9,788 meters, not 9,780 meters, or 32,088 ft., as first reported; see *Ann. der Hydrogr.*, Vol. 40, 1912, No. 11, p. 610.

[2] See *Bull. U. S. Natl. Museum No. 55*, pp. 4 and 51.


BERING SEA
ALASKA
ASIA
Aleutian
ALEUTIAN TROUGH
Kurile Is.
TROUGH
Yezo
Hondo
JAPAN
Bonin Is.
LIUKIU T.
Hawaiian Islands
Philippine Is.
PHILIPPINE T.
PELEW T.
Guam
MARIANA T.
KEI T.
NEW GUINEA
Solomon Is.
BOUGAINVILLE T.
New Hebrides
NEW HEBRIDES T.
New Caledonia
Fiji Is.
Samoa Is.
Tonga Is.
TONGA T.
AUSTRALIA
Kermadec Is.
KERMADEC T.
Tasmania
New Zealand
land
continental shelf
(ocean above 200 meter depth)
troughs
THE TROUGHS
OF THE
WESTERN PACIFIC OCEAN
Based mainly on Groll's
bathymetrical chart of the
Pacific Ocean 1:40 000 000
Equatorial Scale 1:102 000 000

of the Bismarck Archipelago and the southwest side of Bougainville Island of the Solomon Archipelago, and, finally, the New Hebrides Trough, extending along the western side of the New Hebrides group, between it and New Caledonia.

The distribution of these troughs parallel to the great zones of crustal folding along the eastern border of Asia points to the probability of their origin being due to faulting on a large scale. Confirmation of this view and evidence of the present continuation of these deformational movements is deduced by Dr. Krebs from the recent soundings made in the Philippine Trough. Bottom samples from the southern part of this trough conclusively prove the volcanic nature of these deposits. This is entirely in keeping with the frequency of seismic activity during 1903–1911 in the eastern part of Mindanao, parallel to the coast of which, as has already been mentioned, lies the southern part of the Philippine Trough. The most severe of these disturbances, that which occurred in the Agusan Valley on July 12, 1911, was, to be sure, mainly due to slipping along the fault which this valley follows. However, this tectonic movement is directly traceable to disturbances in the Philippine Trough itself, as it was here that the registrations of various European seismographs located the epicenter of this earthquake, and not on land. Dr. Krebs even does not consider it improbable that the record depth of 32,114 feet sounded by the *Planet* on July 2, 1912, had just come into existence, either during the earthquake of July 12, 1911, or during an earlier severe shock which occurred on March 18, 1909.

W. L. G. J.

ON A GENETIC SYSTEM OF SAND DUNES, INCLUDING TWO NEW TYPES

By MICHAEL HALTENBERGER, Ph.D.
Budapest

In the earlier literature about sand dunes and in most text-books of geology and physical geography a distinction is made between *seashore* and *continental dunes*. Sokolow[1] was the first to mention a new type of dune, the *river dune*.[2] The creation of this type caused a certain confusion in what up to this time had been a very simple system. He could not place this new dune type either among the seashore dunes or among the continental ones. Because, if the river dune appears on deltas which extend into the sea, it is no longer topographically a continental, but a seashore dune, although genetically its material is continental. The difficulty is still greater if the waste of the river as well as the sand thrown out by the sea has partaken in the formation of the dunes on a delta. A new type of dune has thence arisen, which the writer is inclined to call a *mixed dune*.

According to his opinion it would be far better to discard the simple system mentioned above, which may be called a geneto-topographical one (this term takes into account both the genesis and the topographical location of the dunes) and to classify the dunes genetically, according to their origin. Thus we could secure a place in the system for the river dune and could include new forms. In this new grouping we differentiate between dunes whose existence depends upon the wind and those to whose creation other factors have also contributed.

The continental dunes are purely æolian, as for instance those of the desert and those occurring close to the seashore. The material of the latter, fine diluvial sand, is blown out by the seabreeze from the wall of the high shore and deposited either on the margin of the upland or a short distance inland. The writer has observed two such cases on the little island Hiddensoe (54° 30′ N. and 13° 5′ E.) in the Baltic, west of Rügen (North Germany). As described

[1] N. A. Sokolow (transl. into German by Andreas Arsruni): Die Dünen, Bildung, Entwicklung und innerer Bau, pp. 147–157. Berlin, 1894.

[2] F. Solger (Studien über nordostdeutsche Inlanddünen, *Forschungen zur deutschen Landes- und Volkskunde*, Bd. XIX, Heft 1, pp. 83–86, Stuttgart, 1910) narrows the application of the term river dune. According to him only a portion of the dunes of this type get their material from the waste transported by the river. Others are created by the weathering of rocks which build up the river basin. These dunes are sometimes older than the river itself.

elsewhere[3] the writer has proposed two new names: *cliff margin* and *high shore dunes* (Figs. 1 and 2).

The diluvium outcrops on the northern side of the hilly part of Hiddensoe, at the slides of the high shore. The seabreeze blows out the sand, carries it up the cliff margin and deposits it there, compelled to do so by the little pine wood standing in its way (Rennbaum or Bismarckdüne is the local name of this territory). The form of these cliff margin dunes is no longer intact. Human and natural agencies have disturbed their original development and have thus created the character of the *wild dune,* which no longer shows the two characteristic slopes of each dune: the smoother windward and the steeper lee side. It is in vain that we measure their declivities; we cannot draw any sure conclusions from these indistinct forms.

If not hindered on its way by some greater obstacle, the sand will settle down a short distance inland from the margin of the high shore at the foot of some juniper bush. The dune (high shore dune) thus formed on the declivity is not yet perfectly developed; the sand has not yet entirely covered the juniper bush. The characteristic slopes, however, are already sharply marked, and therefore there can be no objection to calling it a dune.

The following table gives the dimensions of three such dunes:

No.	Length of the (in cm.)		Mean breadth in cm.	Crest height in cm.	Direction of the major axis	Angle of declivity		Angle of declivity of oblique slope of the high shore
	windward side	lee side				of windward side[4]	of lee side	
1	420	80	280	62	S. 55° E.	29° N.	33° S.[5]	20° N. approx.
2[6]	560	60	290	38	S. 49° E.	29° N.	36° S.	
3	350	70	220	55	S. 56° E.	29° N.	34° S.	

In contrast to the group of æolian dunes stand those of hydro-æolian origin. Under this category we include the seashore[7] and the river dunes. In their formation water has washed the material out of the rock and turned it into sand, which, while being trans-

[3] Michael Haltenberger: Über Art und Umfang des Landverlustes und Landzuwachses auf Hiddensoe bei Rügen (Dissertation, Univ. Greifswald), pp. 69–72. Budapest, 1911.

[4] This includes the angle of declivity of the high shore (20°).

[5] Indistinct on account of vegetational covering.

[6] This dune was formed by the amalgamation of two or three smaller ones.

[7] As the dunes which may be found on lake shores are identical with those of the seashore, we need not mention them especially.

FIG. 1.—Cliff Margin Dunes on the Northwestern Part of the Diluvial High Shore of the Island of Hiddensoe, near Rügen, Baltic Sea. Photograph by the author.

FIG. 2.—High Shore Dunes on the Northern Part of the Diluvial High Shore of the Island of Hiddensoe, near Rügen, Baltic Sea. Photograph by the author.

ported partly by the waves, partly by the inundation of the rivers, partly through the sandbanks under the immediate influence of the air, has been heaped up into dunes by the wind. Consequently water and wind are the two main factors in the creation of hydro-æolian dunes; the one prepares the material, the other forwards it.

The value of the proposed genetic classification, it is suggested, is that it does away with the difficulties of the geneto-topographical system and also gives a proper place to the river dune, which hitherto has occupied only an indefinite middle ground between the seashore and the continental dune.

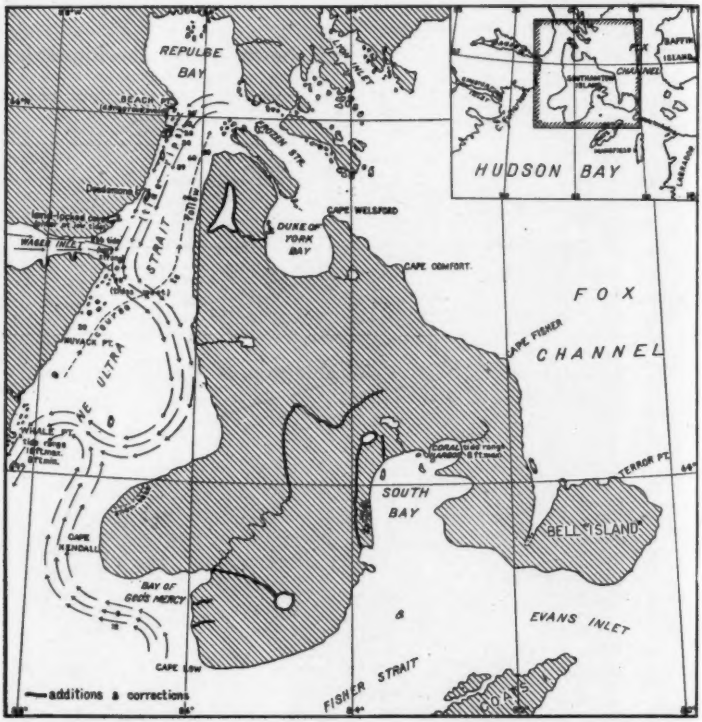
The relation of these two systems is shown in the following table:

Geneto-topographical system	Genetic system
continental dunes	æolian dunes (1) continental (2) seashore (a) cliff margin (b) high shore
river dunes (mixed dunes)	hydro-æolian dunes (1) seashore (2) river
seashore dunes	

Washington, D. C., April 2, 1913.

ADDITIONS TO CAPTAIN COMER'S MAP OF SOUTHAMPTON ISLAND

On his recent return from a prolonged whaling voyage in the waters about Southampton Island, at the northern end of Hudson's Bay, Captain George Comer kindly communicated to the Society various minor changes and additions to his previous map of Southampton Island published in the *Bulletin* (Vol. 42, 1910, facing p. 84), which resulted from observations taken on this trip.



Map of Southampton Island with Additions and Corrections by Captain Comer to his Previous Map (see *Bulletin*, Vol. 42, 1910, facing p. 84). Scale, 1:4,000,000.

These changes and additions have been incorporated in the accompanying map. Where possible, they are distinguished by a heavier line. Specifically, they refer to the following features.

On Southampton Island itself the upper course of the main river emptying into the Bay of God's Mercy has been added, as well as a shorter stream emptying into the same bay and one paralleling the western shore of South Bay, which

has its source in a lake and empties into a cove lying in 63° 35′ N. The two latter abound in salmon, while the first does not. Salmon also occur in the lake-fed stream, already shown in the first edition of the map, which drains into the northern end of South Bay. Attention may here be called to the fact that some of the lakes lying near the foothills (see the original map), which contain salmon, do not always freeze over in winter. Even in the coldest weather the ice, if it forms at all, can be broken through with a stone. The lake in the northernmost peninsula of the island, marked "Salmon Pond" on the original map, should be extended much farther north, as shown on the accompanying map. A few short coastal streams, a range of hills on the western side of South Bay and a permanent snow-bank on the westernmost prong of the island, north of Cape Kendall, constitute the remaining additions made with regard to Southampton Island itself.

With regard to the adjacent waters and their navigation the following additions to the original map have been made: In Ne Ultra Strait various islands and reefs have been added, mainly in 65½° N. (Desdemona Island; so named by Captain Comer after a whaling bark wrecked here in the autumn of 1896, whose crew he saved), 65° N. and 64¼° N. (just north of Whale Point). All of the soundings shown (figures represent fathoms) are new. Changes in the shore-line were made by the addition of coves north of the mouth of Wager Inlet, on its southern shore and north of Whale Point. An island south of Beach Point has been changed to a promontory: there is a good anchorage on its southern side. A cape in 64¾° N. has been given the Eskimo name of Nuvack Point. Good anchorages, which were not shown on the first map, are also to be found in the land-locked cove just mentioned, to the north of the mouth of Wager Inlet and on the western side of Duke of York Bay at the northern end of Southampton Island.

The tidal currents in Ne Ultra Strait are as follows: The flood tide enters from Frozen Strait and follows the western shore of Ne Ultra Strait to Wager Inlet (the tide rips are strong here). The strong ebb tide coming out of Wager Inlet impinges on this current and forces it over towards Southampton Island, as shown on the map, until it is forced back again to the western shore by the southwestern "nose" of the island. Therefore, in navigating Ne Ultra Strait from south to north, a ship should keep the western shore of the strait in sight up to Wager Inlet and then cross over to its eastern shore, as shown on the map.

The tide range, where observed, was: at Whale Point, on the western shore of Ne Ultra Strait, 8 feet as a minimum, 16 feet as a maximum; at Coral Harbor, the inner cove of South Bay on the south side of Southampton Island, 8 feet as a maximum.

The voyage on which Captain Comer made these observations lasted more than two years. He arrived at Cape Fullerton on the western side of the entrance to Ne Ultra Strait (shown on the inset map) on August 14, 1910, and left Repulse Bay, north of its northern end, on September 14, 1912. During the twenty-five months spent in these waters only five small whales were killed, a pronounced decline from previous catches in the same region. Compensation was afforded by barter with the Eskimos, white fox skins being the chief article of exchange.

In this connection it may be mentioned that Captain Comer's original map was reproduced from the *Bulletin* in *Petermanns Mitteilungen* in October, 1910 (Vol. 56, II, Taf. 36), accompanied by a note by H. Wichmann (pp. 191–192). Captain Comer's delineation has also been incorporated on British Admiralty charts Nos. 863 and 2177 and, for the southern part of the island, on the

standard base map of Canada on the scale of 1:2,217,600 published by the Department of the Interior, Ottawa.

Such maps as Captain Comer's, although tentative, are of great value for regions not adequately surveyed. Until superseded by systematic surveys they represent the only material available. Not their least merit is, precisely because of their preliminary nature, to call attention to the necessity for adequate surveys, all the more urgent in the region under consideration in view of the probable establishment of the Hudson Bay-Liverpool route as an outlet for the wheat crop of western Canada.

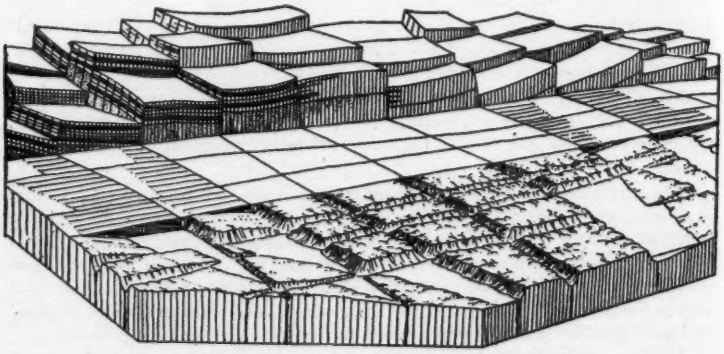
NOTES ON THE DESCRIPTION OF LAND FORMS.—X

Fault-line Scarps in Central Sweden.

EXPLANATION OF MAP OF LAND-FORMS IN THE SURROUNDINGS OF THE GREAT SWEDISH LAKES. By S. de Geer. *Sveriges Geol. Undersök.*, Ser. Ba, No. 7, 1910. 30 pp.

ÜBER DIE BEZIEHUNG ZWISCHEN GEOLOGIE UND LANDSCHAFTSFORMEN IN MITTELSCHWEDEN. Führer einer morphologischen Exkursion. By O. Nordenskjöld und S. de Geer. XI Internat. Geologkongressen, Stockholm, 1910.

There is a district of curious form in central Sweden, which is roughly represented in the foreground section of the accompanying diagram (looking northwest), taken from the writer's "Erklärende Beschreibung der Landformen." The district may be empirically described as possessing a central upland of crystalline rocks, having an equable altitude and being divided into irregular lozenge-shaped masses (of too uniform pattern in the diagram) by a series of narrow, criss-cross valleys, and being bordered on the north and south by broad depressions holding lakes, to which the uplands descend by rather abrupt escarpments of more or less zigzag pattern. The lacustrine areas possess here and there small patches of nearly horizontal limestones, which lie on an even floor of crystalline rocks, and this floor rises slowly north and south from the depressions, and thus again forms uplands of lozenge-shaped masses divided by narrow criss-cross valleys.



Development of Fault-line Scarps and Valleys in Central Sweden.

If the same district were described in explanatory fashion, the description would vary according to the explanation adopted, but all explanations agree that the district has been glaciated. If we follow the Swedish authors above cited, or

the earlier writer, G. Andersson (Om Mälartrakternas geografi, *Ymer*, 1903, 1–64), the district may be described as composed of disordered crystalline rocks, that were long ago reduced to a peneplain, or to a marine platform, then covered unconformably by a series of ancient stratified deposits, uplifted, and exposed to erosion so long that nearly all the underlying peneplain was laid bare and only small patches of the stratified cover remained; then recently divided by many criss-cross faults into lozenge-shaped blocks, of which the depressed members, slanting very gently from the north and south towards a central area, are now partly covered by lakes, while the uplifted higher central area is subdivided by narrow valleys that have been eroded along the shattered zone of the criss-cross faults. According to this explanation, the ancient plain of erosion is seen in the central uplands, stripped of its cover and somewhat the worse for wear; the bordering zigzag fault scarps on the north and south are so recent that they are little affected by erosion; and the neighboring depressions, holding lakes, are essentially due to the down-faulting of parts of the stripped peneplain.

If we follow another explanation, the compound mass, consisting as before of ancient horizontal strata lying unconformably on a smoothly truncated crystalline foundation, was long ago jostled on many criss-cross faults, whereby an uneven surface was produced; the neighboring blocks were thus divided by fault scarps, as in the background of the above diagram; then the district was baselevelled, as in the central part of the diagram, large patches of the covering strata being retained in certain blocks that were gently inclined to a lower level than their neighbors. Later came a broad uplift without faulting, and in the cycle of erosion thus introduced and still current, many narrow fault-line valleys have been eroded along the shattered zone of the faults in the area of the resistant crystallines, and broad lowlands have been excavated, partly by aid of glacial erosion, in the large patches of covering strata, whereby they are reduced to small patches, limited for the most part to the lower parts—the "safe corners"—of their depressed blocks. According to this explanation, the lacustrine depressions have been excavated in the weaker parts of an uplifted peneplain; that is, they are wholly due to erosion on the weaker area of a peneplain worn down on a compound mass of faulted structure, and not to faulting; the central uplands are limited to north and south by resequent fault-line scarps, not produced by faulting but by differential erosion on a faulted structure of unequal resistance; and the equable altitude of the central uplands is not an inheritance of the earliest planation of the region that took place before the deposition of the covering strata, and hence all the longer before the faulting; but is the result of peneplanation after the faulting of the region, and hence all the longer after the deposition of the covering strata.

There are two reasons for preferring the second explanation. First, the numerous lozenge-shaped blocks of the central uplands preserve an even skyline and an equable altitude across the many fault-line valleys by which they are now divided; and this strongly suggests that their upland surface, before its present submature dissection and glaciation, was due to peneplanation after faulting; hence it is of much later origin than the ancient peneplain on which the covering strata were deposited. Second, the small patches of covering strata now survive only in the depressions (the larger and higher patches farther southwest, covered by ancient lava sheets, are not here in question), as if their preservation were due to their lowly altitude at the time when their former larger patches were reduced; and this strongly suggests that the widespread erosion which swept away most of the covering strata took place after the faulting. Had it taken place before, the existing residual patches of the covering strata ought not to have a specialized distribution with respect to the depressed blocks, in the "safe corners" of which the patches actually do occur.

The full establishment of either of the above explanations demands further field work; but the adoption of the first explanation by the Swedish observers, without consideration of the second, necessarily leaves their conclusion open to question. It may be fairly urged that the possession by an investigator of an elaborated scheme of surface forms developed on faulted structures, including fault-line valleys and fault-line scarps produced by the erosion of a faulted mass, as well as fault valleys and fault scarps produced directly by faulting, reacts advantageously in field work by requiring a discrimination between various classes of forms which, under a less complete scheme, would not be distinguished.

This example is one of the many in which the study of surface forms contributes to the deciphering of geological history. According to the first explanation, sketched above, the district concerned has been peneplained only once, namely, before the deposition of the covering strata; and the date of its faulting is so recent that the fault scarps are still pronounced topographic features. The measure of faulting on the north- and south-facing escarpments of the central district is, according to this explanation, closely measured by the height of the scarps, plus the depth of the lakes, plus the thickness of covering strata beneath the lakes; while the faulting on the lines of the criss-cross valleys in the central district must have been chiefly a rubbing up and down with resulting brecciation of the adjoining rocks, so that valleys should afterwards be easily excavated along the fault-line; but there could have been no significant differential displacement here, because the neighboring lozenge-shaped areas are of equable altitude, and because their surface is not diversely tilted, as the ancient peneplain is where it descends gently into the lacustrine depressions.

According to the second explanation, the district has been twice peneplained; first before the deposition of the covering strata, and second after the faulting of the compound mass, as indicated in the background and middle section of the above diagram. The second peneplanation, delicately truncating the faulted blocks somewhat above or below the dislocated parts of the earlier peneplain, is, according to this explanation, responsible for the evenness of the central uplands, as well as for the erosion of the greater part of the covering strata from over the whole area region; while the removal of nearly all the remaining parts of the covering strata has been accomplished in the new cycle of erosion after the broad uplift which followed the second peneplanation; and with the progress of this removal the earlier peneplain has been laid bare in the gently slanting surface of the depressed blocks, the small patches of the covering strata now preserved being naturally limited to the "safe corners" of the deepest depressions near the fault-line scarp. The occurrence of two peneplains, a later one intersecting an earlier one at a small angle, is evidently a possibility, and is actually no rarity, though it has often been overlooked in many districts where it may be demonstrated by close study. Further, the measure of faulting on the north- and south-facing escarpments must have exceeded the measure given above by the depth of the newer peneplain beneath the older one along the margins of the central district; and the measure of faulting on the criss-cross faults of the central uplands, instead of having been insignificant, may have had any significant value. Again, the date of the faulting may be ancient instead of recent; it may have been soon after the deposition of the covering strata, and it may have been followed by several cycles of erosion, of which only a late one is recorded in the peneplanation of the uplands: but the faulting must have been at least remote enough to allow the faulted surface to be peneplained, broadly uplifted, and then submaturely dissected even in its harder parts.

Explanatory description is sometimes objected to on account of its danger of possible error; and in the account of these Swedish escarpments we have a good example against which to direct such objection. Both of the above explanations are current, but both cannot be true. The probability of correctness is, however, in favor of the one that has been adopted after a fair consideration of both; namely, the second. This explanation first came to my attention through a study of the large-scale Swedish maps (sheets 55, 56, 65, 66, 73, 74) of this interesting district, and was confirmed by a two-day excursion across the district fourteen years ago.

Newfoundland Once a Peneplain.

PHYSIOGRAPHY OF NEWFOUNDLAND. By W. H. Twenhofel. *Amer. Journ. of Sci.*, xxxiii, No. 1, 1912, pp. 1–24.

The order of statement in this paper is to be commended, because the needs of the reader are duly considered. After an introductory paragraph, the author briefly states his main conclusion, namely, that "the uplands of Newfoundland are the remnants left by dissection of a once almost perfect peneplain"; then follow several pages giving descriptions of structure and topographic features—these for the most part treated empirically—and of the effects of uplift, submergence and glaciation; finally a few pages are given demonstrating the origin of the

surface features. As a result of this arrangement the paper is easily read and quickly understood. The preliminary statement of results, quoted above, might have been somewhat expanded to advantage; the intermediate pages, not being purely empirical, might well have been more fully explanatory. It savors of artificial restraint to describe the general form of the uplands, their prevailing decrease of altitude to the southeast about 10 feet to a mile, and the presence of numerous surmounting summits only in empirical terms; the reader will recognize the area as an uplifted and dissected peneplain, and will wonder why the writer avoids describing it as such. It is hardly worth while in this modern day to separate by several pages the description of branching bays and the explanation of their origin by submergence. But in the main the order of presentation is worthy of imitation, because of the aid that it gives to the reader; and as the readers of the article are a hundred or a thousand times more numerous than the author, he was well advised in constructing the paper with due regard to their convenience.

A striking feature of the island is an abrupt scarp along the almost rectilinear western border of the uplands where they reach a highland altitude of 1500 or 2000 feet. When viewed from the sea, the highland and its scarp look like an even-crested range of mountains, and probably for this reason the highland border belt is called the Long Range. It is composed of crystalline rocks, while the low foreland along its base consists of sedimentary rocks. Here the commendable order—conclusion, detail, explanation—is not followed; the origin of the scarp is not stated until twelve pages after its empirical description. The scarp is then explained as a fault-face, and the low foreland along its base is thought to have once been continuous with the peneplain of the uplands, the two parts having been since then separated by faulting. This is curiously enough a close repetition of the conclusion reached regarding the scarps of central Sweden, by Swedish observers, discussed in the preceding note; and as in the Swedish example, so here, no consideration is given to the alternative possibility that the scarp is due to differential erosion on a faulted structure, and not to faulting. If the scarp be really due to faulting, then a relatively late date must be given to this dislocation in Newfoundland, and the vertical displacement must have equaled the height of the scarp; but if the scarp be due to erosion on a faulted structure, then the date of the faulting may be placed anywhere between the making of the faulted rocks and the completion of the peneplain now elevated in the gently slanting uplands; and the vertical displacement must have been the height of the scarp, plus the thickness of the strata below its base, plus the thickness of the crystalline rocks eroded from above the present crest of Long Range. Hence, as above noted, geologists as well as geographers may well take heed of the problem here involved.

W. M. Davis.

GEOGRAPHICAL RECORD

NORTH AMERICA

Explorations Now in Progress in Alaska. While the explorations and surveys in Alaska by the Division of Alaskan Mineral Resources, in charge of Mr. Alfred H. Brooks, have been embarrassed by the delay in the passage of the Sundry Civil Bill, much important work is in progress. A geologic and topographic exploration is under way of the region between Valdez Creek (a tributary of the headwaters of the Susitna) and Broad Pass, which separates the head of the Chulitna from waters flowing northward into the Tanana. The Susitna was explored by Eldridge and Muldrow, who crossed Broad Pass in 1898; but the region for a hundred miles to the east is practically unknown except through the reports of prospectors.

The work in this field has been divided between a topographic party led by Mr. J. W. Bagley and a geologic party led by Mr. F. H. Moffit, assisted by Mr. Joseph E. Pogue. The parties are going inland by way of the Copper River R. R. to Chitina, thence by military road to Paxsons, and westward by trail to Valdez Creek. Supplies for the expedition were shipped to Valdez Creek two years ago, but could not be used on account of the failure of the appropriation.

Mr. Bagley is using the photo-topographic method in this field, and, as he has two cameras, it is expected that he will be able to cover a large area. If this work is carried out as planned, it will practically complete the topographic reconnaissance mapping between the 150th meridian, eastward to the international boundary, and southward as far as the summit of the Chugach Range. There will, however, still be a blank area in the central Susitna region.

Mr. C. E. Ellsworth and Mr. Royal W. Davenport are now making a reconnaissance of the water resources of the region tributary to the Copper River, Prince William Sound, and Kenai Peninsula. This will be the first attempt at obtaining engineering data on the water supply of this important province in Alaska.

Dr. P. S. Smith is studying the geology and mineral resources of the Ketchikan district in southeastern Alaska.

Mr. H. M. Eakin left Seattle about June 1 to make a geologic reconnaissance of the region between the Yukon near the mouth of the Tanana and the Koyukuk. While this field has been pretty well covered by prospectors and was traversed by Capt. Henry T. Allen in 1886, no surveys have been made of it. It is expected that Mr. Eakin's work will yield some definite geographical information aside from the geologic results.

These parties are the only ones which will be despatched before the passage of the bill. The work has been planned for some six or seven other parties.

Next Meeting of the Association of American Geographers. The Council of the Association of American Geographers has appointed Princeton, N. J., as the place of the meeting during the holiday week next winter. Professor A. P. Brigham, Secretary of the Association, will sail for Europe in July for an extended sojourn and Professor I. Bowman will act as secretary during the meeting.

Fire in the Geological Survey Building. A fire in the basement of the U. S. Geological Survey, Washington, on Sunday night, May 18, did much damage in the document room containing Survey reports and geological folios and a smaller number of topographical maps. Fortunately, over 90 per cent of the Survey bulletins, water-supply papers, monographs, and other reports had been transferred last winter to the Government Printing Office. Had the fire occurred earlier the loss in documents would have been many times greater. As it was, about a quarter of a million of topographical maps were slightly damaged and the

stock of geological folios was more or less damaged by fire and water, but from 80 to 90 per cent of the folios are believed to be usable. All these folios, the regular price of which is 25 or 50 cents a copy, are now offered to the public at 5 cents each, with no further reduction for wholesale orders. The "reserve stock" of the Survey publications is largely a mass of ashes and charred paper. Many of these reports, from 20 to 30 years old, are now rare books and this loss perhaps constitutes the most serious damage. The total loss was about $75,000.

Western Excursions of the Twelfth International Geological Congress. Several of the excursions in connection with this congress, which will meet at Toronto in August, will go from Toronto to Vancouver. Then an excursion (Aug. 27–Sept. 22) under the leadership of R. G. McConnell, and guided by R. W. Brock, D. D. Cairnes, and W. W. Leach, will traverse the fiords of British Columbia, ascend the Skeena River valley from Prince Rupert to Aldermere by rail and on to Skagway by steamer. The excursion will view the copper mines on Portland Canal and the Treadwell gold mine at Juneau, then cross the Canadian Coast Range by the White Pass and Yukon R. R. to Whitehorse, stopping at the copper deposits there and the coal mines at Tantalus, and descend the Yukon River to Dawson and the Klondike gold field in the driftless interior plateau near 64° N.

Before the Yukon trip, an excursion conducted by Professor Lawrence Martin, University of Wisconsin, will go on a special steamer to the Malaspina Glacier, Yakutat Bay, and Muir Glacier, where Russell, Wright, Reid, Gilbert, and Tarr did their world-renowned work. On the first day the Fairweather and St. Elias Ranges, 16,000 to 18,000 feet high, and covered by snowfields and glaciers, will be in view. The ice tongues include the La Perouse, Malaspina, and many smaller glaciers. The front of the piedmont ice sheet of Malaspina Glacier will be followed, affording an opportunity to see the tidal ice front of the Guyot lobe west of Yahtse River, the moraine-veneered ice cliff of the Seward lobe at Sitkagi Bluffs, and the forest-covered terminus of the Marvine lobe near Point Manby.

On the second day something will be seen of the eastern border of Malaspina Glacier in Yakutat Bay and the forested terminal moraine of the Yakutat Foreland. Landings will be made in Disenchantment Bay in connection with various glacial phenomena such as the shrub-covered ablation moraine on the ice of Variegated Glacier, the streams carrying and depositing outwash gravels, the calving of icebergs from Hubbard and Turner glaciers, the cirque vacated by a fallen glacier, and the beaches, rock benches, sea cliffs, and islands which were uplifted from 7 to 47⅓ feet during the earthquakes of September, 1899.

The third day will be spent on and near the Nunatak Glacier in Russell Fiord. Here the hanging valleys, the till-veneered, overridden outwash gravels, and the tidal and cascading glaciers will be visited and studied, as well as the phenomena of glacial erosion in the barren area from which the ice has recently retreated and of fault scarps made during the 1899 earthquake. Some of these scarps are vertical and are 4½ to 8 feet high.

The fourth day will be given to the morainic and glacio-fluviatile phenomena about the terminus of the Hidden Glacier, which advanced 2 miles between 1906 and 1909, as a result of the earthquake avalanching in 1899, which has subsequently caused 9 ice tongues of Yakutat Bay to move forward. After this landing something will be seen of a fiord with submerged hanging valleys, submarine moraines, buried forests, shorelines depressed in 1899, and the high strand lines of a former glacial lake.

Part of the fifth day will be devoted to Glacier Bay, where there has been a recession of 8¾ miles at Muir Glacier from 1899 to 1911. A landing will be made in Muir Inlet to see the buried forests, the vertical ablation of over 1,200 feet of ice in 20 years, and many other phenomena. The rapid recession of Grand Pacific Glacier in Reid Inlet at the head of Glacier Bay now places part of this fiord in Canada. The glacier melted back 5,000–7,400 feet in two months during the summer of 1912, as was determined by N. J. Ogilvie of the Canadian Boundary Survey. At the International Boundary there is now dry land and open fiord where the ice was at least 1,750 feet thick as recently as 1894. Sixty miles of Glacier Bay have been opened to the ocean by glacier recession since 1794, making an arm of the sea as long as Hardanger Fiord in Norway.

Foreign Honors for American Explorers. The gold medal of the Swiss Geographical Society was presented to Admiral Peary at a banquet in Geneva on May 31.

The Conrad Maltebrun gold medal of the Paris Geographical Society has been awarded to Mr. Alfred H. Brooks of the U. S. Geological Survey. The *Bulletin* for June (p. 442) announced the presentation to Mr. Brooks of the Charles P. Daly gold medal in recognition of his service to geography in the exploration of Alaska.

Dr. John C. Branner Chosen President of Leland Stanford Jr. University. At the commencement of this University on May 19 Dr. David Starr Jordan announced that, at his request, the Board of Trustees had relieved him from the duties of the presidency and Dr. Branner, the well-known geologist and topographer, and Vice-President of the University, had been appointed President. The Board of Trustees has created the new office of Chancellor of the University, which will be filled by Dr. Jordan.

Glacial Studies by Professor Martin. The National Geographic Society has made a grant to Professor Lawrence Martin to enable him to make detailed studies in September at Grand Pacific and Muir Glaciers. He will (*a*) measure the recession of several ice tongues in Glacier Bay, (*b*) look for advances of glaciers, (*c*) study the exhumed forests in relation to former glacial oscillations, and (*d*) make soundings in Canada's new harbor and other uncharted waters recently vacated by the glaciers, to see the effects of ice sculpture below sea-level.

SOUTH AMERICA

A Zoological Expedition to Colombia. The Museum of Zoology, University of Michigan, will send an expedition to the Santa Marta Mountains, Colombia, during the summer. The party will be in charge of the Director of the Museum, Professor Alexander S. Ruthven, and will have as its other members Professor A. S. Pearse, of the University of Wisconsin, and Mr. F. M. Gaige, of the University of Michigan. Work will be confined to a few groups (reptiles, amphibians, mollusks, ants and crustaceans), and an attempt will be made to work out the local distribution and habits of the species. It is expected that the detailed data on the relations of the forms to their environment will throw light upon their relationships and geographical distribution.

EUROPE

The Tenth International Geographical Congress. The Tenth International Geographical Congress, at Rome, Italy, March 27–April 3, twice postponed from the date, October, 1911, originally appointed, was attended by over 200 teachers and authorities in geography and its kindred sciences, accredited by more than 300 governments, societies and universities. It was, on the whole, a gratifying success. Marquis Cappelli, President of the Congress and of the Royal Italian Geographical Society, welcomed the delegates upon the opening session, and, on the following morning, King Victor Emanuel formally received the Congress.

General meetings occupied the mornings and eight sectional meetings the afternoons excepting that upon the last afternoon a fully attended general session was held at which all the recommendations of the several sections were brought before the Congress for action. St. Petersburg was unanimously chosen as the place of the Eleventh International Geographical Congress, the invitations of Lisbon and Vienna not being pressed. The request that Spanish be included as one of the official languages of the Congress, after debate, was withdrawn.

Resolutions were adopted proposing a commission to meet this year at Paris, to establish minor and conventional details for the 1:1,000,000 map of the world, to which shall be referred all questions, graphic and phonetic, of nomenclature; creating a commission, of which Prof. E. L. Stevenson, of the Hispanic Society of America, is a member, to restore ancient maps; a commission to initiate an atlas, in relief, of the world; approving acceptance of the invitation of the Royal Danish Geographical Society, favoring an international conference to arrange for an international aeronautical map on the scale of 1:200,000; reaffirming the declarations of the Congress at Geneva in 1908, and the Commission at Monaco

in 1910, upon the importance of a thorough oceanographical survey of the North Atlantic, and urging the governments, directly concerned, to push the work; recommending that the 1:1,000,000 map commission take up the question of a geography to accompany their work; suggesting a commission to settle on names along mountain frontiers and, where the adoption of a single name is impracticable, to give definite reasons for more than one; and strongly urging greater attention in public schools, particularly in the secondary grades, to geographical study and excursions.

The American members of the Congress were Rear-Admiral Robert E. Peary, who, as president of the Eighth International Geographical Congress in the United States in 1904, was received with special honor, representing the Association of American Geographers; Prof. William H. Hobbs, of the University of Michigan, representing the Philosophical Society of Philadelphia; Herbert L. Bridgman, representing the American and Philadelphia Geographical Societies and the Brooklyn Institute, and Vilhjálmur Stefansson, representing the National Geographic Society. Lantern views, by Prof. William Libbey, of the exterior and interior of the American Geographical Society's new building, were shown to the Congress and received with manifestations of interest and approval.

The Royal Italian Geographical Society gave a banquet to the Congress on Wednesday evening, March 31, and arranged excursions to interesting localities in Italy of which many delegates availed themselves.

Dr. Hobbs's Activities in Europe. Dr. Wm. H. Hobbs, Professor of Geology in the University of Michigan, has recently returned from ten months' absence abroad. Professor Hobbs was the delegate of his University at the celebration of the 250th anniversary of the founding of the Royal Society which was held in London in July last. In late August, as the guest of the International Glacier Commission, he attended the conferences at the University of Grenoble and in the Alps of Dauphiné. At the annual meeting of the Schweizerische Geologische Gesellschaft, held at Altdorf, Switzerland, September 8–11, Dr. Hobbs was elected Honorary President of the Society and in this capacity presided at all except the business sessions. Owing to the exceptionally cold and rainy season of 1912 the snow line in the Alps descended some 200 meters below its usual level and so prevented the carrying out of projected studies upon the changes in temperature within the bergschrunds at the highest levels upon the Alpine glaciers. The summer of 1912 was therefore devoted to tectonic studies in the region of the Central Alps. Later in the year Professor Hobbs delivered addresses before the geographical societies of Austria and Hungary at Vienna and Budapest, his subject being *Das Muster im Erdrelief*. The winter of 1912–13 was spent in Egypt with trips into the Libyan desert and the Sudan for the study of deserts, with special reference to erosion and transportation processes and to the evidences of recent changes of climate. In the spring of the present year two weeks were devoted to a tectonic study of Malta and Gozo, which had been suggested by the peculiar outlines of these islands. As delegate of the American Philosophical Society and the University of Michigan, Professor Hobbs attended the Tenth International Geographical Congress at Rome, where he presided for a portion of the time in the sections of physical and morphological geography.

POLAR

Arctic

Stefansson's Arctic Expedition. Mr. Stefansson left New York on May 26 for Ottawa and the west. His barkantine whaler, the *Karluk*, 247 tons, had been partly rebuilt and strengthened at Esquimalt, B. C., and was being loaded with supplies for the expedition. The *Karluk*, with the scientific staff, was expected to steam north early in June. Stefansson intended to take the regular mail steamer and join the *Karluk* at Nome, Alaska. The party under Dr. Anderson, who are to engage in ethnological and other work on the Canadian mainland and the neighboring Arctic islands, will have a vessel of twenty tons in which they can navigate the coastal waters with greater facility than in a larger boat. Captain Bartlett, who gave such efficient service to Peary's enterprises, will be in command of the *Karluk*.

The scientific staff consists of eleven persons in addition to Stefansson and Dr. Anderson. The Canadian Geological Survey has detailed four men: George Malloch, a specialist in stratigraphy; J. J. O'Neill, mining geologist and specialist in copper deposits, who is to study the copper region near the lower Coppermine River and also the copper deposits of Victoria Island which Stefansson and Dr. Anderson discovered on their last trip; Kenneth Chipman and J. R. Cox, topographers.

One of the main objects is the investigation of tides and currents, ocean depths, character of the sea floor and other phases of the oceanography of the North Pacific and adjoining Arctic waters. This work will be in charge of James Murray, Glasgow, who has for years been associated with the oceanographical researches of Sir John Murray. He was biologist with Shackleton on his Antarctic Expedition.

Fritz Johansen will give special attention to the study of Arctic fish. He was a member of the Mylius Erichsen expedition which completed the mapping of Greenland. For two years he has been engaged in scientific service for the Department of Agriculture at Washington.

Two anthropologists will make a special study of the blonde and other Eskimos—Henri Beauchamp, a specialist in American archæology, and Dr. D. Jennes, an Oxford man, who was engaged by cable from New Zealand. Terrestrial magnetism will be in charge of W. T. McKinlay, a graduate of the University of Glasgow and a physicist. The surgeon is A. Forbes Mackay, M.D., of Edinburgh, for some years surgeon in the British Navy and later surgeon of the Shackleton Expedition. Mr. Stefansson has also engaged a well-equipped photographer, a part of whose work will be to show by cinematograph films the life of the Eskimo, especially those who are met before their habits are changed by contact with the whites. Most of the *Karluk's* crew have been selected from the American whaling fleet.

The *Karluk* will put into Nome only long enough to replenish all the stores and fuel consumed on the month's voyage from Victoria. If good luck favors she should round Point Barrow, the most northern point of Alaska, late in July, which is the earliest time possible on account of the ice. If westerly winds should prevail, Beaufort Sea will be choked with ice and the expedition may not reach its field of work this season. Such was the case in 1906 when Mikkelsen and Leffingwell could not penetrate Beaufort Sea. The same conditions in 1908 prevented Stefansson and Anderson from receiving their food supplies.

If easterly winds prevail, however, Beaufort Sea will be free of ice and the *Karluk* will be able to reach Herschel Island in safety. Eight men under command of Dr. Anderson will disembark and in their small power boat loaded with arms, ammunition, stores and scientific equipment will go eastward to Victoria Island, near Coronation Gulf. Here Dr. Anderson will establish his base camp and with the scientific members of his party will carry on further investigations of the natives, study the copper deposits, etc.

The *Karluk* meanwhile will stand due north approximately along the meridian of 141° W. and go on till she is stopped by ice or a land mass. Some scientific men are inclined to think with R. A. Harris, of Washington, that there may be land of important extent in that region.

If, however, Beaufort Sea is choked with ice, the *Karluk* will push as far east as possible, drop Dr. Anderson's party as near as may be to his proposed base on Victoria Island, and then point northward towards Prince Patrick Island. Sooner or later Prince Patrick Island will be Stefansson's base from which by dog sledge over the frozen Polar Sea and also on land he will extend his explorations in this region, which for the most part is entirely unknown. Mr. Stefansson abandoned his idea of carrying a wireless equipment, as it would necessitate eleven tons of extra freight and two men who would be useless except as wireless operators.

Dr. Anderson expects to maintain his base on Victoria Island for at least a year, changing to another base later in accordance with the requirements of his scientific work. If possible, the *Karluk* will return south for supplies next year and also in 1915. The expedition hopes to complete its work and return home in the summer of 1916.

ANTARCTIC

A Wireless Despatch from Mawson. The advantage of wireless connection with explorers in the field has just been demonstrated in a remarkable manner. Reuter reports, under date of Sydney, May 12, the receipt of a wireless telegram from Dr. Mawson's Antarctic Expedition, which is spending the winter at Adelie Land, on the coast of Wilkes Land. It will be remembered that the explorer's ship was not able to reach Mawson's camp at that point on its return after taking on board the part of the expedition in charge of Mr. Wild. There was consequently much anxiety as to the welfare of Mawson and his men. The wireless despatch will relieve this uncertainty. It says that the first number of a newspaper, named the *Adelie Blizzard*, has been published at the present headquarters of the explorers; that the expedition hut is practically snowed up and that the penguins and seals disappeared shortly before the bay became frozen over. Only the Antarctic snow petrels now remain. The members of the party, who are well, are collecting valuable data.

EDUCATIONAL GEOGRAPHY

Columbia University. The summer school courses at Columbia under Prof. D. W. Johnson were announced in the June *Bulletin* (pp. 450–451). Miss Kirchwey and Prof. McFarlane will give courses at the Teachers College in educational geography, including a course in the teaching of geography and arithmetic by Dr. McFarlane and Mr. Vosburgh, and courses in general geography and continental geography for schools by Miss Kirchwey.

University of Pennsylvania. The summer session will extend from July 7 to Aug. 15. Mr. G. B. Roorbach, Instructor in Geography, will have charge of the three courses: (1) Physical and Economic Geography with field excursions; (2) Political and Economic Geography of Foreign Countries, devoted to the principal countries, the conditions that have guided the political division of continents and the geographical forces affecting the internal development and external relations of nations; (3) Commercial Geography of the United States, the lectures supplemented by excursions to industrial plants, wharves, etc.

Cornell University. Professor R. H. Whitbeck, of the University of Wisconsin and editor of the *Journal of Geography*, will teach in the Department of Geography at Cornell University during the summer session.

University of Chicago. Much attention will be paid to geography in the summer session. Professor Salisbury and Mr. Bretz will lecture on physiography, the elements of meteorology and oceanography; Mr. Brokaw on mineral resources of the United States; Miss Lanier will give courses on the elements of geography and economic and commercial geography. Mr. Schockel will conduct an elementary field course showing in a small area a variety of influences of topography, soil and natural resources on life conditions. Assistant Professor Tower will give courses on political geography and the geography of South America. Associate Professor Barrows will conduct the courses on the influence of geography on American history and the conservation of natural resources; also a course beginning September 1, involving the study of the life and industries of selected areas as influenced by physical conditions and natural resources, the field of this work being the Cumberland Plateau and the southern Appalachians.

University of Alabama. The summer school for teachers (June 12–July 23) will include a course in geography for teachers in common schools conducted by Miss Sarah E. Luther. Dr. W. F. Prouty, Professor of Geology in the University, will lecture on "The Story of the Earth."

University of Illinois. Geographical courses will be included in the summer session.

University of Montana. Professor Charles C. Adams will give a course on "General Ecology" at the summer school Biological Station on Flathead Lake. This is a course on the response of animals to the physical and biotic environment—on the borderland between zoology and geography.

University of Michigan. Professor F. Carney will conduct the geographical courses at the summer school. The subjects are: (1) a teachers' course in physiography; (2) geographical influences; (3) geography of North America.

University of Missouri. The geographical courses at the summer session embrace advanced physiography with a course in general geography as a prerequisite, the course including text books, laboratory work, and field excursions; and an elective problem course in physiography. These courses will be in charge of Prof. W. A. Tarr.

University of Wisconsin. The summer session embraces courses in physical geography, commercial geography, regional geography, weather and climate and a field course in physiography and geology.

State Normal School, Salem, Mass. Mr. S. W. Cushing, at the head of the Department of Geography in this school, will be lecturer and leader in discussions in the field of commercial geography at the Commercial Teachers Institute to be held at the school.

Michigan State Normal College, Ypsilanti, Mich. The geographical courses will embrace teachers' geography (two sections twice a day for six weeks) by Mr. Walsworth and Miss Clark; physiography (once a day for six weeks) by Mr. Walsworth; geographical lesson plans (twice a day for six weeks).

Western State Normal School, Kalamazoo, Mich. A six weeks' course in geography will be given under the direction of Mr. L. H. Wood. The subjects embrace: (1) Land Forms; (2) Climate and Climatic Regions of Europe; (3) Europe and Asia—Type Studies; (4) Industrial and Commercial Geography based on the Geography of Michigan.

Teaching Geography to the Blind. In a lecture before the Société Normande de Géographie on April 20, 1912, Prof. Pierre Villey of the Faculté des Lettres of Caen, himself blind since childhood, told of methods in use to teach geography to the blind. He said the best way to convey cartographic information is from a fixed point on a model similar to relief models. The data are then observed by touch around this point in outward progression so that the blind will gradually form mental pictures of a region by means of these tactile perceptions proceeding from a central point.

It is necessary first to give the students instruction in local relationships. They are first made to familiarize themselves with the topography of their rooms and houses, the adjoining gardens and so on. Finally intimation of the world outside the city limits is suggested by walks and excursions. The student is then ready to acquire intelligible notions of geography by passing his hands over geographical models specially prepared for his use.

The lecturer exhibited maps for the blind, one made of staff and the other of very tough paper. Towns were represented on both by isolated dots. Mountains, by clusters of dots of a different shape. Grooves were rivers. Their inner sides were made exceedingly smooth so as to allow rapid touch perception. Striated areas were seas and were depressed below the land areas. These maps are mute, as the Braille system of writing takes up much space. Each map is therefore provided with an explanatory book in which the names of the topographic features are designated. (*Bull. Soc. Normande de Géogr.*, Vol. 34, Jan.–March, 1912, pp. 43–45.)

PERSONAL

Prof. Charles C. Adams, University of Illinois, will continue this summer an ecological survey at Flathead Lake, Montana, which he began last year at the Biological Station of the University of Montana.

Assoc. Prof. Wallace W. Atwood, University of Chicago, will have charge in September of a group of advanced students for geological field work in the San Juan mountain area. He also expects to continue the physiographical survey of these mountains in Colorado under the auspices of the U. S. Geological Survey.

Prof. Eliot Blackwelder, University of Wisconsin, will continue in the field all summer his areal geological study of the Teton Range and adjacent parts of western Wyoming. He has been engaged in this work for the past three years.

Mr. H. L. Bridgman, who represented our Society at the Tenth International Geographical Congress, Rome, made a tour later which took him into Dalmatia and other parts of the Balkans, and to Budapest, Vienna, Innsbruck, etc. He has returned home and is preparing an illustrated lecture on "Victorious Bulgaria," in which he will attempt to show, among other things, what the Balkan War of 1912–13 means to America.

Prof. A. P. Brigham, Colgate University, is going abroad to visit various parts of Germany and to spend the autumn and winter in Berlin. He will also make excursions in other parts of Europe before returning home.

Prof. R. M. Brown has resigned his position as head of the Geography Department of the State Normal School, Worcester, Mass., and will begin work in September as head of the Department of Geography at the Rhode Island Normal School, Providence, R. I.

Prof. Frank Carney, University of Michigan, before and after the summer session at the University, will continue his work for the Ohio Geological Survey, mapping in detail the shorelines of pre-glacial lakes.

Mr. Sumner W. Cushing, head of the Department of Geography, State Normal School, Salem, Mass., will make a short visit to eastern Canada and also continue to prepare for publication the material he collected during his recent field work in India.

Mr. N. H. Darton has recently returned from a short trip to southern New Mexico to complete a geological survey of Luna County for the U. S. Geological Survey. A topographic map of the county has also been prepared to serve as base for the representation of the geology. The region is one of wide bolsons or desert plains with scattered mountain ranges. Under a portion of the bolsons water is obtained in large volume, and it is now being extensively utilized for irrigation. One of the purposes of the investigation was to ascertain the area in which water is available. A visit was also made to Elephant Butte in central New Mexico to examine the condition of the rocks at the site for the great dam which the Reclamation Service is to build to impound the waters of the Rio Grande.

Mr. Charles A. Davis, of the Bureau of Mines, Washington, D. C., will study this summer the distribution of peat deposits in New England and Minnesota.

The newspapers announce that Prof. W. M. Davis was elected a member of the French Academy of Sciences at its meeting in April. The Royal Dutch Geographical Society of Amsterdam has elected to Honorary Membership Prof. W. M. Davis of Harvard University, "the great master of geographical demonstration in the field and in the art of organizing excursions in the old and the new world, the ingenious founder of a logical system of geomorphology, one of the pioneers in the theory of evolution in geographical science." Prof. Davis will perhaps make a trip to Montana this summer.

Prof. R. E. Dodge, Teachers College, will spend much of the summer in completing editorial work and other writing.

Prof. N. M. Fenneman, University of Cincinnati, will attend the Geological Congress at Toronto and, if provision be made by Congress, he expects to engage in folio work in the Miami Valley for the U. S. Geological Survey.

Prof. H. A. Gleason, Assistant Professor of Botany, University of Michigan, lectured on phytogeography during the last semester and completed a paper on the relation of prairie fires to forest distribution in the middle west. On Sept. 1 he will join the International Phytogeographical Excursion (reported in the Jan. *Bull.*, p. 45) for a week and will leave about Sept. 10 for a year's travel, during which he will visit Australia, the Philippines, Java and Ceylon.

Prof. J. Paul Goode, Associate Professor of Geography, University of Chicago will spend the summer in completing a series of wall maps for colleges and schools that are to be published by a Chicago map house.

Prof. H. E. Gregory, of Yale, is spending the months of May, June and July studying the geology and water resources of the Navajo Reservation, in parts of New Mexico, Arizona and Utah, under the auspices of the U. S. Geological Survey.

Mr. F. P. Gulliver will give lectures this summer on home geography topics for the Borough Summer School Association, Philadelphia. As geographer of the Chestnut Tree Blight Commission of Pennsylvania he will study the relation of soil and climate to the growth of chestnut trees and the spread of the chestnut blight. His work will take him throughout the state and at times into surrounding states. He is also planning to study the limestones of Pennsylvania and to visit limestone deposits in New York, New Jersey and Maryland.

Mr. R. M. Harper, of the Geological Survey of Alabama, will write the results of some of his recent botanical journeys and continue his field study in several eastern states.

Prof. W. H. Hobbs will attend the International Geological Congress at Toronto and the excursion for glaciologists. He will give most of the summer to writing.

Prof. G. D. Hubbard, Oberlin College, will take a student field party into camp in the Virginia mountains for topographical and geographical mapping and studies of the region. The excursion will cover seven weeks from June 26 to Aug. 15. Later Prof. Hubbard will engage in physiographical work in Ohio collecting data for the State Geological Survey, which will ultimately be published in a bulletin on the physiography of that state.

Prof. E. Huntington, Yale University, will devote the summer largely to writing, but will give a part of the time to a study of the relation of efficiency and climate which has engaged some of his attention for a year and a half.

Prof. Mark Jefferson, Michigan State Normal College, will spend the summer at Horton Bay or at his home in Ypsilanti.

Mr. O. E. Jennings, of the Carnegie Museum, Pittsburg, will spend three months on a botanical expedition to the north of Lake Superior, where he will carry on studies in the ecological distribution of plants.

Prof. D. W. Johnson, Columbia University, will write the report on the Shaler Memorial Investigation of shoreline changes along the Atlantic Coast. He will also attend the Geological Congress at Toronto for a few days and will make one or two fairly extended field trips with the summer school classes.

Mr. F. E. Matthes, U. S. Geological Survey, is going to the Yosemite region of California to study the physiographical problems bearing on the origin of the Yosemite Valley.

Prof. H. F. Reid, Johns Hopkins University, will be present at the International Geological Congress at Toronto, but does not expect to go on any of the excursions.

Prof. R. D. Salisbury, Chicago University, will participate in the work of the summer session of that institution and spend August and September among the western mountains.

Mr. E. W. Shaw, U. S. Geological Survey, expects this summer to extend the work on (1) the physiography of the Gulf embayment and (2) the constitution and mode of growth of the Mississippi Delta. This will include much purely geographical work and also some oceanographical researches off the mouth of the Mississippi. He is likely also to make a trip to several points in the upper Mississippi Basin in Illinois, Wisconsin, Iowa, Missouri and Kansas.

Mr. Frank B. Taylor, geologist, Fort Wayne, Ind., will be engaged in geological field work in the area of the Taconic Quadrangle in New York State and western New England and later in the fall he expects to do some field work in southwestern Ontario.

Asst. Prof. Walter S. Tower, University of Chicago, expects in September to study the economic geography of northwestern Canada, mainly along the line of the Grand Trunk Pacific R. R.

Prof. R. DeC. Ward, Harvard University, will spend the summer on his forthcoming volume, "Climatology of the United States."

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

(The size of books is given in inches to the nearest half inch.)

NORTH AMERICA

Economic Beginnings of the Far West: How We Won the Land beyond the Mississippi. By Katharine Coman. Vol. 1: Explorers and Colonizers. xix and 418 pp. Vol. 2: American Settlers. ix and 450 pp. Maps, ills., bibl., index. The Macmillan Co., New York, 1912. $4, 2 vols. 8 x 5½.

The table of contents includes: Vol. 1, Part I, The Spanish Occupation, The Explorers, The Colonizers in New Mexico, Louisiana, Texas and California. Part II, Exploration and the Fur Trade, The Northwest Coast, The Overland Search for the Western Sea, The Fur Trade. Vol. II, Part III, The advance of the Settlers in Louisiana and Missouri Territory, The Santa Fé Trade, The Colonization of Texas. Part IV, The Transcontinental Migration, The Acquisition of Oregon, The Mormon Migration, The Conquest of California. Part V, Free Land and Free Labor.

The purpose of the work, in the words of the author, is "to suggest the underlying economic conditions that determined the outcome of war and treaty and race competition and reveal the bread and butter struggle that must ever result in the survival of the fittest."

Work of the economic historian is grist to the geographer's mill, and, potentially, the reverse should be true. Miss Coman's volumes will be welcomed by geographers since so many of the economic facts and factors must be explained in part by geographical influences. Some of the topics treated show a fairly keen realization of these influences. The treatment of California is a case in point. The Spaniards, as the author points out, possessed an inherited training in irrigation and readily adapted themselves to the Mediterranean climate of Southern California. Later, when a decreasing output of gold forced the people into agriculture, the mild winters and natural pasturage led to cattle and sheep raising and to wheat cultivation. The climate favored citrus fruits and vineyards in this region of long sunshine and low rainfall.

The chapter on the Mormon migration is of great interest geographically but the reader must to a great extent supply the geographical setting. This great movement, unique because religious rather than economic, found a lodgment, at first tentative, at the base of the Wasatch Mountains on the deposits of the extinct Lake Bonneville. Here at the site of Salt Lake City the ground was plowed, after irrigation from a hastily constructed dam, and the first crops were grown. The map showing the progressive extension of the "Stakes (colonies) planted in Zion," page 88, is most suggestive, for they extend along a narrow zone near the base of the Wasatch Mountains where soils are productive and irrigation water is easily procured.

Of course the author was necessarily confined to her study of events on their economic side, but it would seem that a brief statement of the geographical environment of the various localities would be worth the space in volumes of this kind, especially since it appears in many places that the author has personally seen and studied many of the localities under discussion. The work is exceedingly welcome to geographers, since it is only with such aid that geography in the best sense can be written. Abundant maps and illustrations and an extensive bibliography add to the value of the work. F. V. EMERSON.

Alfalfa Farming in America. By Joseph E. Wing. 528 pp. Ills., index. Sanders Publishing Co., Chicago, 1912. $2. 8 x 5½.

One would hardly believe at first thought that 522 pages of rather close print could be devoted to the subject of alfalfa. By introducing in great detail the history of alfalfa, the methods of planting, developing and harvesting, the variety of uses and the occurrence of the product on different parts of the earth's surface, this considerable volume has been compiled.

The book seemingly is intended to be read as a story. It is also intended to excite sufficient interest to cause the reader to enter upon the alfalfa growing industry at once. It will undoubtedly serve well as a reference book for those who may seek special information concerning "seeding and cutting," "alfalfa diseases," "alfalfa for the silo," and like details. A rather complete index adds to its value. EUGENE VAN CLEEF.

Principles of American Forestry. By Samuel B. Green. xiii and 334 pp. Ills., index. John Wiley & Sons, New York, 1911. $1.50. 7½ x 5½.

This book meets in a very attractive way the needs of elementary students and the general reader. The contents cover an adequate statement of the tree, tree growth, the forest, forest influences, tree planting on prairies, propagation, regeneration, protection and mensuration of forests, nursery practice, rate of increase in timber trees, uses and durability of woods, forest economics and a very valuable and suggestive chapter on forest problems dealing with many special, typical cases.

To the geographer all is interesting, but the fourth chapter is most germane. It contains little that is new, but the grouping of data is excellent and the statement lucid. Forests prevent evaporation, retard snow melting, and delay surface distribution of water, hence are conducive to perennial streams, high water-table, and perpetual and copious springs; they are condensers of dew, and gatherers of frost and ice. They apparently do not increase rainfall but greatly enhance its effectiveness. On the treelessness of the prairies chief weight is given to scanty rainfall poorly distributed through the year, coupled with great evaporation. Burning by Indians to aid grass growth is a contributing cause. Tables of silvicultural data, and uses of important American trees, glossary and bibliography follow the text. G. D. HUBBARD.

Our Vanishing Wild Life, Its Extermination and Preservation. By William T. Hornaday. xv and 411 pp. Maps, ills., index. Charles Scribner's Sons, New York, 1913. $1.50. 8½ x 6.

A foreword by Professor H. F. Osborn characterizes this work as an "alarm call" to battle against the careless and selfish destruction of many forms of wild life. The writer in his preface champions the rights of 97 per cent of the people as against the 3 per cent whose main aim is to kill. Long closed seasons or a gameless continent—such is the alternative set before us as an incentive to immediate action.

Preceding the title page, we find in parallel columns a startling lesson. On the left is a paragraph quoted from the report of a committee of the Ohio legislature in 1857, soberly affirming that the passenger pigeon needed no protection. On the right is a picture showing on its perch the last living passenger pigeon, now twenty years old, in the Cincinnati Zoological Garden. An early chapter gives a list of a dozen or more species of North American birds which are now extinct. A further list is given of twenty-three species, all of which are now threatened with extinction.

Among the large mammals completely exterminated are the Arizona elk, the quagga, the blaubok, which is an African antelope, and Burchell's zebra of Africa. Almost extinct are the Tasmanian wolf, West Indian seal, California elephant seal and California grizzly bear. "The Regular Army of Destruction," "Guerillas of Destruction" and "Unseen Foes of Wild Life" are somewhat sensational but effective chapter heads which bind attention to astonishing disclosures. Striking revelations are made of the slaughter of song birds by Italians, the destruction of song birds in the South by negroes and poor whites, and extermination for women's hats. A list of over sixty species is given of birds thus undergoing extermination for London and other European markets.

The forces of defense are fully described, with an ample exposition of the defects of present game laws and of the protective restrictions that are needed. The book is written with a keenly stimulating vigor and is well fitted to arouse indignation, cultivate conviction and stir to endeavor. It is at once a cyclopedia of fact and a summons to action. A. P. BRIGHAM.

The National Geographic Society Researches in Alaska. By Lawrence Martin. *National Geographic Magazine*, Vol. 22, 1911, No. 6, pp. 537–561. Maps, ills.

This paper records the results of four months' study of Alaskan glaciers by Professor Martin in 1910, continuing studies by Tarr and Martin in 1909. The field of observation was Prince William Sound and Yakutat Bay. The opportunity was of special importance owing to the fresh action of some glaciers due to avalanche snows contributed to the glaciers through a series of earthquake shocks in 1899. In the case of several Yakutat Bay glaciers the advance is known to have begun several years after the agitation. It also appears that the longer glaciers required more time to exhibit the forward movement.

Much study was given to the Childs Glacier, which flows through a lateral valley to the banks of the Copper River. This glacier began its unusual advance in the winter of 1909–1910, and in the summer following the front margin was advancing from two to eight feet each day. Undercutting by the river and "sloughing" caused strong erosion of the opposite bank. By Oct. 5 the total advance of front was about a third of a mile. Along parts of the margin impressive results were seen from day to day, in plowing up the earth and the overturning of trees which the day before were standing at the edge of the glacier. The movement threatened the safety of the great railroad bridge, costing $1,400,000. The glaciers of the Copper River and Prince William Sound are not in the zone of avalanching to which Yakutat Bay belongs and the cause of advance is left in doubt. Several glaciers were found to be receding. A. P. BRIGHAM.

SOUTH AMERICA

Vitcos, the Last Inca Capital. By Hiram Bingham. 64 pp. Ills. Reprint, *Proc. Amer. Antiquar. Soc.*, April, 1912. Worcester, Mass. 9½ x 6.

There is much to be said in favor of the piecemeal presentation of the results of Professor Bingham's explorations into the ancient civil geography of Peru. He sacrifices the bulk of the ponderable masterpiece which might impress the casual reader, but to those who watch his sane and cautious, yet always brilliant, progress through the tangle of the disputes which have clouded Inca chronology and the Peruvian geography in which it found its development, each of these brochures stands as a masterpiece of research in the field and of interpretation upon the terrain of the problems of orientation which in the study have evaded all attempts at solution. The expedition recorded in this monograph was addressed to the settlement of the site of the last Inca capital, that mountain fastness in which the young Manco Inca found a refuge from Pizarro. In this work Professor Bingham presents cogent reasons for identifying the Inca's Vitcos with the site now known as Rosaspata and for establishing his temple of the sun, Yurak Rumi, upon the ruins which he traced at Nusta España. The author is the third in brilliant succession to set the name of Hiram Bingham in the roll of those who have given us knowledge of obscure folk; to his father we owe our best information upon Ni Makin and Ni Peru of the Gilbert Archipelago, and to his grandfather is due the history of the introduction of civilization to the Hawaiian Islands.

WILLIAM CHURCHILL.

AFRICA

The African Rubber Industry and Funtumia elastica ("Kickxia"). By Cuthbert Christy. xvi and 252 pp. Map, ills., index. John Bale, Sons & Dainelsson, Ltd., London, 1911. 12s 6d. 9 x 6.

A monograph on the African rubber tree, *Funtumia elastica*, and also a practical treatise. In the preface the author says he is fully conscious of his literary failings; but the reader will say the book is well written. The style is fluent and the descriptions are precise and clear. The book might have been improved,

however, by a more systematic arrangement of topics, by condensation in place[8] and by occasional comparisons with other rubber plants and conditions in other countries.

The rubber species *Funtumia elastica* is confined to central and western Equatorial Africa, between 10° N. and 10° S., that is to say, to the Southern Sudan, the Belgian Congo and French Equatorial Africa, Guinea, the northern part of Angola and the western portion of Uganda. This is the tropical forest region of heavy rainfall, exceeding 50 inches a year.

Christy spent five years in East Africa and Uganda, traveled also in most of the West African Colonies and gained his knowledge of the rubber industry from personal experience and from his intercourse with those who are practically interested in the plant. He also utilized scientific literature dealing with the chemistry of rubber, and the climate and soils adapted to its cultivation.

HENRYK ARCTOWSKI.

ASIA

The Duab of Turkestan. A Physiographic Sketch and Account of Some Travels. By W. Rickmer Rickmers. xv and 564 pp. Maps, ills., index. University Press, Cambridge. University of Chicago Press, Chicago, Ill., 1913. $9.44, postpaid. 10½ x 8.

The "Duab," or "Two Rivers," is a name applied by Mr. Rickmers to the part of Russian Turkestan between the Amur and Syr Rivers, the ancient Oxus and Jaxartes. This includes the khanates of Bokhara and Khiva. The portion dealt with most thoroughly is the Zarafshan valley and the mountains at its head. The purpose is to give a complete treatment of the geographical features of a single definite region possessing considerable unity. Topography, climate, flora, fauna and human population are all discussed and are frequently compared with those of other regions. A fair number of statistics are given and in addition there are many descriptions of scenery, of the habits of the people, and of ordinary incidents of travel. Taken as a whole the book gives a clear picture of the Duab as it exists to-day under Russian rule.

The volume is an interesting example of the present stage of geographical development. The author is not a geographer by profession; he is an excellent traveler with a keen interest in the things which he sees and with a strong desire to explain them. Having become especially interested in the region of the Duab, which he has visited many times, he has read widely to train himself in geographical principles. The result is a book which stands midway between the mere accounts of travel which were called geography in the past, and the thorough treatment of geographical regions by specialists which will form the geography of the future. Feeling that geography is a new science and being conscious of the large number of problems which his reading has opened to him, the author devotes a large portion of his space to what may be called geographical and especially physiographic philosophizing. In other words, he attempts to explain and elucidate a large number of matters which are familiar to the trained geographer but not to the average reader. In all doubtful questions he is extremely careful to introduce as many modifying considerations as possible and goes so far in this that in some cases one cannot form one's own opinion and is in doubt as to what may be that of the author. He succeeds admirably, however, in impressing upon the reader the fact that in spite of recent advances in the physiographic side of geography only a beginning has been made and there is still an enormous field for research.

The chief problems discussed by Mr. Rickmers are all more or less directly climatic. They are touched upon somewhat in the main body of the work, but their chief treatment is in an appendix of fifty pages or more, where conclusions are summed up. The most important subjects are present climate, the relation of forests to climate, the snow line, glaciation, desiccation, sand and loess. In the body of the volume the author emphasizes the rapidity and wholesale character of erosion among dry mountains where sudden floods, avalanches, and the like cause detritus to come down from the mountains in large quantities during short periods. He dwells especially on mud avalanches or "mud spates," a term which he advocates for general use.

The most important portion of the book is the discussion of the connected

problems of glaciation and desiccation. The author believes that glaciation in a country so dry as Central Asia must be due rather to increased humidity than to lowered temperature. He holds that deglaciation and desiccation must be carefully distinguished and that they are not necessarily parts of the same process. He suggests that the decrease of glaciers may cause an increase in the size of rivers and thereby may produce a result apparently the reverse of desiccation. This springs from his idea that the basins of Central Asia are practically self-contained so far as their supply of water is concerned; that is, that they receive almost no water from the surrounding oceans and give up almost none. The process of desiccation according to him is largely due to a gradual diminution of the available water in the central basins of Central Asia. Long ago an encroachment of the sea filled the basins and supplied a large amount of water whose gradual escape beyond the limits of the basins has brought on desiccation.

In regard to changes of climate during historic times Mr. Rickmers is decided in his opinions. In the first place, as he says on page 510, "Happenings of the present time and even of the last century are quite immaterial in this problem. . . . Five hundred or 1000 years form about the smallest unit of sub-division. The abandonment of the dead cities of the Lop basin (Tarim) is only just admissible as evidence. . . . Anything observed during the past century, or covered by the latest exact scientific records, such as the meteorological observations or the rise of Lake Aral during the last thirty years, does not count at all." Again, on page 519, speaking of Lake Aral, he says: "Berg has shown a rise of the lake from 1880 to 1901 amounting to an average of 90 mm. per year. He uses this undeniable fact as an argument against progressive desiccation with which, of course, it need not have anything to do." This point is well emphasized because many writers have fallen exactly into Berg's error. Rickmers' studies leave him convinced that there is a "stubborn tendency" toward desiccation which may, however, be slightly interrupted by periodic fluctuations. "Looking backward," he says (p. 523), "a progressive desiccation attacking the irrigation fringe seems fairly certain and need not have been very great in order to affect many thousands of people. It was more extreme and rapid in the Lop basin than in the Duab." As to the future he contents himself with saying that the chances are in favor of a continuation of present conditions.

ELLSWORTH HUNTINGTON.

Anson Burlingame and the First Chinese Mission to Foreign Powers. By Frederick Wells Williams. x and 370 pp. Ill., index. Charles Scribner's Sons, New York, 1912. $2. 8½ x 6.

If the story of Burlingame were to be written at all it is well that it has fallen into such sympathetic hands, for Prof. Williams was so situated at his most impressionable period that the men and principles who and which were developing at the gates of China were household words.

The career of Anson Burlingame follows a sharp line of cleavage. On one side he is to be studied as a representative of American polity not only in the Far East but at home as well, a polity based on utter ignorance and developed by timorous and vote-saving submission to the violence of Sand Lot oratory upon our Pacific shore line. On the other side he demands attention as the forerunner, indeed the discoverer, of an external polity for China, an empire which had endured throughout the other history of the world, content in its own self-satisfied seclusion and as ignorant as incurious of the exact position of the barbarian nations. In this latter and less comprehensible division of the work Prof. Williams has pursued a very direct and cautious method. It is in the very essence of conditions at the Chinese court and in the dominant circle of the literati that he has by no means been able to make it clear that Burlingame was sent abroad as the representative of the Dragon Throne in a whole-hearted desire that China should take a place among the nations of the world. It must probably remain impossible of determination whether the Chinese court really intended to learn the true position of its oldest civilization in relation to the newer civilizations which it probably scarcely comprehended to be civilizations in any sort, or whether the Burlingame mission was devised as a convenient sop to the varied demands of the foreign powers. Was Burlingame the directing mind or was he but a convenient pawn in the game? Prof. Williams regards him as the former. The verdict of history is valuable only in proportion as it has data

upon which to formulate its judgment; it is most improbable that history will ever have more data than those which the author has here assembled.

WILLIAM CHURCHILL.

China, the Country and Its People. By G. Waldo Browne. With an Introduction by the Hon. John D. Long. xiii and 477 pp. Dana Estes & Co., Boston. $2.50. 10 x 7½.

At some time some benefactor of the race will insist that popular works on geographical themes shall be written with scrupulous accuracy. Really the obligation is infinitely greater in the case of popular works where the readers are left quite defenceless against the author, for professional geographers can correct for themselves the errors which creep into professional treatises, while the untrained reader is led far astray. China has become of foremost interest in the present overthrow of the last Tatar dynasty. The reader is entitled to have a story without distortion such as appears too frequently in this volume. Interesting as the observance is to students of social customs, we can imagine that the couvade is a matter of scant significance to the general reader, but if the author felt that his theme required five lines and a couplet on the subject, as on page 131, he might have seen to it that it was not described as convade. There is an unusual mechanical feature in this book: it is only upon the right hand pages that there is a running head line and page number, the left hand pages being left bald. In one particular the work has peculiar value. Many of the abundant illustrations are reproduced from photographs. But at least half of the pictures are reproductions in line of a famous series of colored lithographs which were published in Paris some time before 1860. The original prints are now a great treasure to collectors, their reproduction here makes them in this wise accessible to many who might not be able to see the originals.

WILLIAM CHURCHILL.

Le Tibet Révolté vers Népémakö, la Terre Promise des Tibétains. Par Jacques Bacot. 364 pp. Maps, ills. Hachette et Cie, Paris, 1912. Fr. 15. 9½ x 6.

The author, having been in Tibet in 1907 and written thereupon a noteworthy volume, returns to Tibet in 1909 and asks himself what there can be, what there really is, about a land so inaccessible and so inhospitable which brings back the traveler who has once experienced its pains. A land, he calls it, of shepherds and of monks, forbidden land to strangers, cut off from the world and such a near neighbor of heaven that the natural occupation of its people is prayer. This narrative gives us to see somewhat of the reason. Bacot does not pretend that this is a pleasant land, he minimizes none of the inconveniences and the dangers of the travel, he makes no excuse for the dirtiest land on earth; but his story is filled with the delight in which he pushed among the mountains and forced his way against opposition. His route lay eastward of the line of British approach to Tibet; a country was traversed which had not even been touched by the devoted and anonymous agents of the Indian Trigonometrical Survey. Upon his outward march from Yun-nan-sen he opened new territory in the east of unknown Tibet and penetrated as far north as Tchangou, where he touched the region explored by Mr. Rockhill. From that point he turned south in unknown valleys as far as Conkaling, thence westward to connect his survey with his own former observations in 1907 in the valley of the upper Salwen, thence returning south along the rivers with which his former exploration had made him familiar. He is a shrewd observer and his description of this remote Tibet loses nothing of interest in his vivacious style of narrative.

WILLIAM CHURCHILL.

The Progress of Japan, 1853-1871. By J. H. Gubbins. 323 pp. Map. Clarendon Press, Oxford, 1911. 9 x 6.

The author considers the transformation of Japan from a nation living in seclusion to a great and modern civilized power, to have occurred between the arrival of Commodore Perry in Japan in 1853, and the signing of the Portsmouth Convention in 1905. He divides this time into two periods, the first comprising the rise and fall of the Shogunate, the administrative rulers as distinguished from the sovereigns of Japan, which ended with the abolition of feudalism in 1871. It is with this preliminary stage that Mr. Gubbins especially deals. He

covers briefly the history of Japan from Jimmu Tenno, the semi-mythical personage who reigned some 600 years before our Christian era, to the coming of foreign treaty-makers. From that time the history is continued in more detail. The appendices include numerous political documents, many of which are otherwise accessible only in the Japanese text. The book is written in a concise and interesting style. WILBUR GREELEY BURROUGHS.

The Empire of India. By Sir Bampfylde Fuller. x and 394 pp. Maps, ills., index. Little, Brown & Co., Boston, 1913. 9 x 6.

This work falls quite successfully into the scheme of the series of which it forms an important part, the series of handbooks of the units of the British Empire. Designed for secondary education and to serve as works of library reference for those who do not need to go exhaustively into the particular subjects, these volumes serve a valuable end. It is essential to such a scheme that controversial points be avoided and that industrial information be supplied. Thus we lose the romance with which the history of India is filled, the jeweled magnificence of the Great Mogul is absent, Hyder Ali and Warren Hastings and Tippoo Saib are alike lacking, Honorable John Company appears only as a collection of merchants buying and selling. Perhaps the history of the Indian empire is better studied without the chapters which made it interesting; perhaps it better profits the reader to memorize the mileage of canalization and its anticipated effect upon the death rate through famine, to collate the statistics of import and export trade, to learn the extent of imperial tax collection. All such material of blue books is here condensed and made available for reference. Therein lies the value of the work, a manual, a handbook to be kept on the shelves for the settlement of disputed questions; and this value subsists in the fact that the author has served out a distinguished career in the civil administration of India in positions of great executive functions. WILLIAM CHURCHILL.

Monumental Java. By J. F. Scheltema. xviii and 302 pp. Ills., index. The Macmillan Co., New York, 1912. $4.50.

This volume, long expected, richly accords with the hopes of those who knew the author's great fitness for just such a work as this. The volume is rich in archæological detail yet it is not an archæological treatise. It is filled with temple architecture, yet we scarcely recall a table of dimensions of this or that shrine which lifts the thought to the heaven always warm and near in Java. It takes up the sad burden where Douws Dekker's "Max Havelaar" ceases exhausted and arraigns the colonial administration of Netherlands' India, yet its arraignment is never polemic. All this we knew we might expect from Scheltema's active years in Negri Java, mere incident to that which sets this book at once in the forefront of the literature of the Malayan Orient. All these things are but the setting for his appreciation of the jungle and its vistas slowly revealing enticing glimpses of those temple façades crowning green heights, tracery of lace in stone, and, after the last tangle of the trees has been threaded, the full view of the temples in such grandeur of aspiration as no other spot in the world has known. From Pringapoos on the Dieng, in western Java, he takes us from temple to temple through Prambanan and Toompang, to mention without choice where all attracts, and thus to the sublime emotion of Java in Boro Budur, that mountain of glyptic art. Java has given the theme for one great and compelling book in Wilhelm von Humboldt's "Ueber die Kawisprache." After seventy years Scheltema has produced another. WILLIAM CHURCHILL.

A Tramp's Sketches. By Stephen Graham. xiii and 339 pp. The Macmillan Co., New York, 1912. $1.60. 8 x 5½.

This book was written while the author was tramping along the Caucasian and Crimean shores of the Black Sea, and later, on a pilgrimage with 7,000 Russian peasants to Jerusalem, where he lived the life of the pilgrims "in the hospitable Greek monasteries and in the great Russian hostelry at the Holy City," bathed with them in Jordan, where all were dressed in their death-shrouds, and slept with them a whole night in the Sepulcher. The life of the people through whose country Mr. Graham passed, the descriptions of the places which he visited, and the incidents and adventures encountered on his journey are set forth vividly. WILBUR GREELEY BURROUGHS.

AUSTRALASIA AND OCEANIA

By Flood and Field. Adventures Ashore and Afloat in North Australia. By Alfred Searcy. 327 pp. Map, ills. G. Bell & Sons, Ltd., London, 1912. 6s. 8½ x 5½.

This is a story of adventure on the northern shores of Australia a number of years ago. The book contains an attractive element in the tales of many narrow escapes and the adventures with animals and natives, but as it appears to have been written as a reminiscence, there is the chance that many of the details may have taken on unnatural values. Without doubt an accurate idea of the difficulties of the early traders on these shores may be obtained from the narrative; and the life of the natives, the condition of the country and the labor of the first settlers are vividly pictured. R. M. Brown.

An Introduction to the Geology of New South Wales. By C. A. Süssmilch. xii and 177 pp. Maps, ills., index. Dept. of Public Instruction, Technical Education Branch, Sydney, New South Wales, 1911. 5s. 8½ x 5½.

A little book giving in compact form, primarily for students, an account of the physiography, general geology, and economic geology of New South Wales. Incompleteness of knowledge of the geology of the state makes necessary many gaps in the treatment of the subject. The author adopts the classification of formations used in Europe and North America, but does not believe that formations bearing like names in Europe and Australia were of contemporary origin. In general, the succession of animals and plants in Australia is similar to that in other parts of the world, but with at least two marked differences: (1) the hideous saurians which dominated the land life of the Mesozoic elsewhere are wholly absent from Australia; (2) placental mammals, either as fossils or as living indigenous animals, are also absent, but monotremes and marsupials, both Tertiary and present, are represented on a scale wholly unknown elsewhere. The author considers that there is satisfactory evidence of two glacial epochs in the Pleistocene period, but that the glaciers were of very limited size. There are several colored maps and a large number of excellent illustrations.

R. H. Whitbeck.

Meine Reise nach den Strafkolonien. Von Dr. Robert Heindl. 470 pp. Ills. Ullstein & Co., Berlin-Wien, 1913. 9½ x 7.

More than half the volume is devoted to a record of the impressions which the author received in the French deportation colony of New Caledonia. He is by no means unmindful of statistics and the machinery of the regulation of prisoners, but the best feature of his study is that he takes a keen interest in the welfare of the criminals, the opportunity which is given them to reform and the attitude of the administration. His narrative abounds in vivacious description of scenes which will do far more than any earlier work upon New Caledonia to present a faithful spectacle of the life of that crime-stained pool of the dregs of French life. Another large section of the volume is given up to an equally interesting account of the Andamans and the British treatment of Indian criminals. The volume will prove quite as attractive to students of geographical literature as it will to penologists. Between these more important chapters is inserted a review of modern prisons in Australia with reminiscences of the former transportation system, a summary sketch of Chinese penal methods and the prison establishment at Ceuta. Jail is surely an odd goal of journeying (he makes a jest upon this theme through failure to recognize the English spelling of jail as gaol); but, no matter what the end, he has succeeded in making a valuable contribution to the knowledge of Nouméa and Port Blair.

William Churchill.

EUROPE

The Building of the Alps. By T. G. Bonney. 384 pp. Ills. T. Fisher Unwin, London, 1912.

Like all the books by Canon Bonney, this beautifully printed volume is written in a pleasing style, and by reason of the author's long and intimate

familiarity with the Alps as a place of recreation, it will make a strong appeal to the traveler with a taste for scientific reading. It is likely to recommend itself particularly to the climbing fraternity because of the author's prominence in the Alpine Club recognized in his election to the presidency.

Both in its title and in its preface the book lays claim, however, to be something more than a pleasant discursive series of readings, and it is here that it is open to serious criticism. Particularly during the last fifteen years, views held concerning the structure of the Alps have passed through a revolution remarkable enough to punctuate sharply the history of modern geology. When Dr. Bonney began his Alpine studies Escher's conception of the double fold, later elaborated and extended to new districts by Heim, his pupil and successor, represented the accepted view of Alpine structure, and it continued to be standard doctrine until within the last fifteen years.

When, however, Bertrand's keen suggestion of successive vast overthrusts had been successfully applied to the central Alps by Schardt and later in more detail by Lugeon, it began to be seen that the older conception was untenable; and with the acceptance of the new view by Heim himself in 1898, in Switzerland, at least, the older hypothesis was to a large extent abandoned. Since the history of science supplies few parallels to this complete reversal of view by a savant of the first rank whose whole lifework had become identified with an older conception, it must indicate both the cogency of the arguments and the unusual breadth of mind of the man. Strangely enough it does not stand alone in this remarkable revolution in the history of Alpine geology, for the late Professor Uhlig, long identified with Alpine tectonic studies, at first attacked the new conception only to become later its warm advocate.

To-day throughout Switzerland the necessity for assuming in the Alps a succession of vast blanket-like layers (*Decken*) separated by surfaces of disjunction (overthrusts) is recognized by all, and the supporters of this view in other Alpine countries are becoming augmented steadily in numbers. Many geologists, and among them the reviewer, believe, however, that the *explanation* of the structure is inadequate and mechanically unsound. Because of the new light thrown upon the subject of Alpine structure by the new conception, the efficient Swiss Geological Commission under Heim's direction is now remapping geologically the entire national domain.

This important subject is treated by Professor Bonney without mention either of M. Bertrand or of Professor Schardt, the real founder of the new school; and the work of Lugeon is passed over with the statement, "I have also maintained that some of the sections which the latter cites as favorable to his hypothesis, are either improbable in themselves or involve mistakes in the identification of rocks, and that such transference across the axis of the Alps would be under the conditions then existing, mechanical impossibilities—impossibilities which do not even require discussion." This does not produce a favorable impression upon the well-informed reader, the more so since Professor Bonney's list of excursions into the Alps does not indicate that he has entered the crucial districts since the new ideas were promulgated.

The glaciers of the Alps are discussed at considerable length along the line of the author's earlier publications. After reiterating his view that glacial cirques are due to erosion by water as originally outlined in his initial paper upon the Alps (1871), Professor Bonney says: "Certain geologists in America and in Germany have attributed to the action of snow and glaciers the following features—corries and cirques, the formation of many valleys, the deepening and enlarging of others," leaving it to be inferred that an undivided British school accepts his own view—an assumption which has already called forth a sharp protest. After somewhat fully quoting the accurate observations made within a bergschrund by W. D. Johnson, the author says: "I believe these processes to be largely imaginary. The temperature in the lower part of the bergschrund would be comparatively uniform." Almost at the time these words were written a countryman of the author was descending into bergschrunds upon the Blümlisalpstock with results since published which confirm in every particular the observations of Johnson and in addition supply a measured day temperature at the bottom which was several degrees above zero.

Dr. Bonney devotes considerable space in attempting to show that Alpine

valleys are not markedly U-shaped in cross section, and that they have been shaped almost exclusively by water. To quote him: "Thus valley after valley in the Alps seems to leave no escape from the following dilemma: either a valley cut by a glacier does not differ in form from one made by running water, or one which has been excavated by the latter, if subsequently occupied, is but superficially modified by ice."

In the section on Alpine Meteorology we find the statement, "The Föhn is a wind from the south, hot, stifling, and dry, supposed to come from the deserts of North Africa," a view long since discarded. One lays down the book with the conviction that science has moved forward since the genial and lovable author began his Alpine studies, but that he is scarce conscious of the fact. The material changes which time has wrought in opening up the Alpine Highland during this period are delightfully told in the closing chapter, entitled: "Fifty Years of Change." In this direction chiefly and in its touches of local color the book must make its appeal to all who know and love the Alps. It is, moreover, beautifully printed and illustrated by excellent photographs from many sources.

WM. HERBERT HOBBS.

POLAR

The South Pole: An Account of the Norwegian Antarctic Expedition in the "Fram," 1910–12. By Roald Amundsen. Translated from the Norwegian by A. G. Chater. Vol. 1, xxxv and 392 pp. Vol. 2, x and 449 pp. Maps, ills., index. John Murray, London. Lee Keedick, 140 Nassau St., New York. 1913. $10. Postage extra. 9½ x 6½ each.

The English edition of this work is superbly produced. None of the geographical flavor has been sacrificed in the translation from the Norwegian by Mr. Chater. Amundsen's plans for equipment, his sledging methods, hygienic régime and all other phases of his work were so richly the result of his own experience and that of others and of the devices he originated for meeting the special problems before him that the detailed account of them in these volumes adds much to the value of his narrative. Meteorology, the complete meteorological record from Framheim, the astronomical observations at the Pole and oceanography have adequate treatment in the appendices. The chapter on oceanography was written by Professor Björn Helland-Hansen and Dr. Fridtjof Nansen. Amundsen's book in the German edition was so adequately reviewed in the *Bulletin* (Vol. 44, 1912, pp. 903–908) by Professor W. H. Hobbs that no extended further notice of it is here required.

GEOMORPHOLOGY

The Making of the Earth. By J. W. Gregory. Home Univ. Library. 256 pp. Index. Henry Holt & Co., New York, 1912. 50 cents. 7 x 4½.

The author is Professor of Geology in the University of Glasgow. He does not indicate whether he designs the book for general readers or for geologists and geographers. For the best profit in reading the work the former class would need some preliminary knowledge. The professional student will find a compact and useful summary of present views on some of the deeper problems of the origin and history of the earth.

One of the principal chapters deals with the nebular origin. The author appears to be in accord with the planetesimal theory as expounded by Professor Chamberlin, holding that the evidence as it stands is consistent with the hypothesis of a nebula consisting of a swarm of meteorites, ascribing the gaseous conditions postulated by Laplace to the more primitive stage of the nebula.

For the geographer the most suggestive chapter is, perhaps, that on the "Beneficent Influence of Segregation." By various processes of rock making and rock change the materials of the constituent meteorites were separated and brought together, like to like, forming the different kinds of common rocks and the great variety of useful materials produced in these rocks by secondary changes.

The volume is divided into four parts, each with a series of short chapters.

The captions of the parts are: the Origin of the Earth; the Growth of the Earth's Surface; the Plan of the Earth; the Share of Life in the Preparation of the Earth. In the third part we find a sympathetic and interesting account of the tetrahedral theory. A. P. BRIGHAM.

METEOROLOGY AND CLIMATOLOGY

Forecasting Weather. By W. N. Shaw. xxvii and 373 pp. Maps, ills., index. D. Van Nostrand Co., New York, 1911. $3.50. 9 x 6.

A combination of the principles of practical forecasting and the principles of meteorology has not been attempted often enough. This volume embodies such an effort. The many illustrations consisting of maps, diagrams and charts are always directly associated with the text. The discussion is concrete in nearly every instance so that the reader is not left to conjecture; however, the statements are not dogmatic but give the reader opportunity to judge for himself. It is doubtful whether elementary students could use the book successfully; on the other hand it constitutes an excellent reference book for advanced students.

The use of the expression "synoptic chart" sounds somewhat strange to the American student who is accustomed to hearing the term "weather map." On page 104 the term "transitional" is applied to "a vast number of examples" of "barometric distributions" which are "different from the pronounced family types." In Chapter XV the value of types to the forecaster is discredited. In fact on page 336 it is stated that "In dealing with this matter" (referring to average paths) "the forecaster must make use of his own experience of weather charts. . . . No forecaster can afford to depend upon the average." It is refreshing to receive such statements as these and others quite as good in contrast with those of some of our leading American forecasters who seem to fear acknowledging the fact that probably most of their accurate forecasts are the result of their personal experience and their failures the result of their dependence upon types.

The interesting discussion beginning on page 162 on the formation of cloud, hail, rain and snow, raises a number of problems worthy of much consideration. "Surface heating does not necessarily mean an ascending air column" *et seq.*, on page 170, should have the attention of the old school of students of meteorology who still believe this statement incorrect. The beginning of Chapter VI, The Physical Processes of Weather, ending with "it is not possible often to say whether a center of low pressure is the cause or the consequence of a westerly current," is well worth study.

Although the volume employs as a basis conditions for only a small portion of the earth, the British Isles, it treats of much that has broad application and therefore is a welcome addition to the field of meteorology and in particular to the special phase, forecasting. EUGENE VAN CLEEF.

Das Klima. Von Dr. Eugen Alt. 136 pp. Maps, index. Series: Bücher der Naturwissenschaft, 12. Band. Philipp Reclam, Jr., Leipzig, 1912. 80 pfg. 5½ x 4.

Within the compass of 132 small pages of text, Dr. Alt has given an admirable outline of the principles of climatology, surprisingly complete when the size of the volume is considered. The elements of climate, with reasonable emphasis upon the more strictly meteorological aspects of the subject; the climatic zones; the characteristics of the zones and of the different climatic types; changes of climate, and climate and civilization, all receive attention. There is even space for a remarkably good account, within 30 pages, of the climatography of the continents. The book adds another to the rapidly increasing list of books, in German, of course, which, almost in "vest pocket size," and at absurdly low prices, have been published within the last few years on climatology and meteorology. The present volume contains three charts, in colors, showing the pressures, temperatures and winds for January, July and the year. As the Rocky Mountains are not on the Pacific Coast of North America, and Oregon and Washington are no longer territories, it is hoped these erroneous statements will be corrected in the next edition of this excellent work. R. DEC. WARD.

MATHEMATICAL GEOGRAPHY AND CARTOGRAPHY

Kartenkunde. Von Dr. M. Groll. I: Die Projektionen. 120 pp. Ills., index. II: Der Karteninhalt. 142 pp. Maps, index. Sammlung Göschen. G. J. Göschen, Berlin and Leipzig, 1912. 80 pfg. each. 6½ x 4½

These volumes, the first devoted to projections and the second to maps, are Dr. Groll's individual treatment of cartography in distinction from the former single volume in this series bearing the same title, the third edition of which he revised and extended for the original authors. The new work is far more than a mere expansion of the old to double the number of pages since the order of treatment is changed and the subject brought fully up to date. The detailed explanation of elementary principles is characteristic of the Göschen series, while at the same time the two little volumes give as thorough a discussion of the subject as can well be presented from the standpoint of elementary mathematics.

The first volume begins with the simple geometrical constructions needed for drawing the projections, including the description of the instruments and even of the method of sharpening lead pencils. This introduction is followed by chapters on various groups of projections according to their construction, including a final tabular summary of the members of the different groups according to their properties and a discussion of their adaptability to special uses. The volume closes with a brief but excellent account of the chronological development of projections illustrated by well chosen small scale reproductions bringing the subject up to 1910.

The second volume gives a discussion of the preparation and use of maps from preliminary triangulation through field sketches, methods of showing relief and various typographical processes of map reproduction to an examination of the limits of accuracy in the exact measurement of location, distance and area on the finished map. Following the scheme of the first volume the work closes with an historical account of the evolution of cartography illustrated by uncolored reproductions of a few ancient maps and of some of the best types of modern European work.

R. S. Holway.

ANTHROPOGEOGRAPHY

Man and His Conquest of Nature. By Marion I. Newbigin. viii and 183 pp. Ills., index. A. & C. Black, London, 1912. The Macmillan Co., New York. 75 cents. 7 x 4½.

Miss Newbigin's *Man and His Conquest of Nature* is a book for the general reader, full of facts and suggestions as to causal relationships between man and his geographical environment. In scope it reminds one of Herbertson's *Man and His Work*, but in detail and manner of treatment it is essentially different.

The volume includes twelve chapters; the earlier ones are devoted to the characteristics of types of societies presented around certain instances as examples. The larger part of the book treats of man's relations to the domesticated animals, plants, minerals, the food supply of the sea and similar topics. The material is always presented from the human side, and is generally interesting. If the book were printed in better type, it would be more appealing to the general reader, as the content of the book is especially suited to the needs of the person who is ignorant of the richness of modern geography.

Inviting and suggestive as it is, the volume is yet disappointing, for the generalizations and the principles that the author would establish do not stand out clearly. They are lost sight of in the multitude of detailed illustrations, each of which is an absorbing unit for attention by the reader.

Richard Elwood Dodge.

ECONOMIC AND COMMERCIAL GEOGRAPHY

Dry Farming: A System of Agriculture for Countries under a Low Rainfall. By John A. Widtsoe. In the Rural Science Series. xxii and 445 pp. Ills., index. The Macmillan Co., New York, 1913. $1.50. 7½ x 5½.

If any one be ignorant of what dry farming is, he should read first Chapter XX, entitled Dry Farming in a Nutshell. This will suggest briefly the problems underlying this much advertised and much misunderstood method of agricultural practice in regions of deficient rainfall. The rest of the book outlines clearly

and in detail the large and small principles underlying dry farming, and presents a full and adequate treatment of the subject for the novice as well as the expert.

The several chapters discuss the problems of rainfall and climate for dry farming, the character of soils in dry farming areas, the methods of storing water in the soils and of regulating evaporation, the processes and needs of tillage, the character and composition of dry farm crops, the relation of dry farming to irrigation, and the present status of dry farming in the world. The history of the development is outlined and a good bibliography is included.

The book is well written and generally well illustrated, except for occasional indistinct cuts. It is complete and practical, and everywhere shows the hand of an expert who has done much for the development of a method of tillage and cropping that has greatly increased the availability of our western lands. Dry farming has its limits, its followers will have their disappointments, but dry farmers who follow the author's suggestions will win out when it is possible to do so. Farmers in humid regions, who believe that tillage is only to kill weeds, will learn much of help to them from this exposition of a method that seems at first not to concern them—for dry farming is in large part exaggerated soil tillage.

This book, by a master of his subject, ranks among the best of our recent popular, scientific and practical agricultural books. RICHARD ELWOOD DODGE.

The Story of Cotton and the Development of the Cotton States. By Eugene Clyde Brooks. x and 370 pp. Ills. Rand, McNally & Co., New York, 1911. 75 cents. 8½ x 5.

The increasing demand that our schools come into closer contact with industrial life has been difficult to meet because of the lack of such books as this. The history of the cultivation of cotton in Europe, the introduction of cotton culture into the United States and the development of the manufacture of cotton cloth are the main themes. The book presents a consecutive and logical account of the development of clothing and the facts that led to cotton as the "King of clothing." While the treatment, in a large degree, is historical and economic, the various phases of the activities incident to the culture and manufacture of cotton and the evolution in the art of manufacturing after the war are discussed. A comprehensive view of the commercial importance of the plant to the world, the science of its cultivation, and its varieties and by-products is also given.

R. M. BROWN.

TEACHING AND METHODOLOGY

Geographical Note Books. By Richard Elwood Dodge. Books I–IV. 32 pp. and maps in each. Atkinson, Mentzer & Co., New York, 1912. 10½ x 8 each.

Teachers of grade geography have to thank Professor Dodge for putting on the market a thoroughly practical series of note books at such a remarkably low price as to be within the reach of most schools. The books give laboratory exercises with outline and relief maps of continents, countries and smaller divisions. The questions are skilfully planned to bring out in a clear, interesting way important relations, such as position, size and direction, among cities, states, countries, continents, climatic belts, oceans, etc. Experience has shown that they attain high success in holding the interest of the pupils, in helping to establish large geographical truths, and in supporting modern thought by making geography a reasoning subject. SUMNER W. CUSHING.

ANTHROPOLOGY

L'Uomo secondo le Origini, l'Antichita, le Variazioni e la Distribuzione Geografica: Sistema Naturale di Classificazione. Di G. Sergi. xxvii and 421 pp. Map, ills. Fratelli Bocca, Torino, 1911. Lire 20. 10 x 6½.

Professor Sergi is a bold and original anthropologist whose works are too little appreciated outside of Italy, though most English-reading students are familiar with his "Mediterranean Race." That is, however, only one, and by no means the most important, in a very long series of books and pamphlets which mark the steady advance of a gradually maturing system. In "L'Uomo" Professor Sergi's theory and method have reached their full development and the book is undoubtedly one of the most important which have appeared for many years. It is to be hoped that it will soon be translated and made accessible to

all biologists and anthropologists. The formidable terminology will certainly terrify all dilettanti, but it will not deter real students, especially if they are familiar with the style and classification employed in botany and zoology.

For the foundation of the Sergian system is the perfectly sound axiom that physical anthropology is only a branch of biology. The axiom is universally admitted—and almost universally neglected. Sergi has fulminated for years against the prevalent idolatry of measurements and indices with all the artificial divisions and arbitrary classifications which result from it. But the old tradition has been too strong. Now, however, that we have arrived at a stage when physical anthropology is appropriated by professors of mathematics, so that it seems to be more closely allied to meteorology or astronomy than to the study of living forms, it is time that we should halt and listen to the man who has long warned us that we were straying. "A tutti i concetti vaghi e incoerenti io voglio sostituire determinazioni reali derivate da osservazioni morfologiche su i molteplici gruppi umani e una sistemazione naturale."

It is a gigantic task, the scientific classification of all the human inhabitants past and present of this globe; only a man of untiring industry and of wide and deep experience could attempt it. These qualities his most implacable opponents must admit that Sergi possesses. I would go further and say that he possesses also that rare gift which is indispensable to great works of synthesis, the power, namely, of intuitive divination which forms hypotheses not susceptible of immediate verification but ultimately justified, inasmuch as they are based upon the unanalyzable instinct of a mind steeped to the core in the processes and laws of science. The success or failure of such a great work of systematization must, in fact, depend to a great extent upon the powers and abilities of the man who undertakes it. There are no objective laws except those which he discovers, no standards or rules but those which are dictated by the nature of the material as it presents itself *to his mind*. And therefore it is impossible to pass any judgment until the whole scheme is complete. This is the reason why it has never been easy fairly to estimate the value of the preceding studies which have led up to "L'Uomo." Not until this book appeared have we had a full exposition of the Sergian theory, on which nevertheless the whole logical structure of the author's earlier work was based. It should now be the duty of every sincere and fair-minded anthropologist to study it without prejudice or *parti pris* and to test it patiently and sympathetically. "Specie e varietà umane" was the title of a work of Sergi's in which fourteen years ago he advanced the principal views upon which his work is founded. In "The Mediterranean Race," in "Africa," "Asia," "Europa," as well as in numerous minor works he has developed and extended them. "Specie e varietà umane" is a fighting title, for there is scarcely an anthropologist in recent years who has not tacitly or explicitly assumed that *homo sapiens* is a single species. And yet Darwin did not consider the matter to be outside the field of argument—on the contrary, in his "Descent of Man" (Part 1, Chap. 7), he musters very powerful arguments for the view that there may be several species, and evidently inclines to go as far himself as to admit the existence of sub-species. But all that we have learned since Darwin's day certainly does not weaken the case for sub-species or species among the Hominidæ; rather the numerous discoveries of primitive and fossil man might be considered to have strengthened it. Nevertheless, the assumption is always made that because the human inhabitants of every part of the world seem to be capable of interbreeding and producing fertile offspring, therefore, they must belong to a single species. This is forcing the conception of species beyond anything that is warranted by the writings either of Darwin or of Wallace. At the head of his preliminary chapter of "Dichiarazioni," Sergi prints Darwin's definition of species and devotes many pages to a triumphant demolition of the prevalent view. He argues on general grounds that the true definition of species does not necessarily imply incapacity to produce fertile hybrids, and on particular grounds that our knowledge as to the interbreeding of human types is too deficient to prove anything one way or the other. Both lines of argument are unquestionably sound; and it should be remembered that in the realms of zoology and botany the conception of species is reverting, after many vicissitudes, more and more to that of a term "arbitrarily given for the sake of convenience to a set of individuals closely resembling each other"—Darwin's own definition. There would seem, therefore, to be no valid reason

a priori why the division into species should not be applied to mankind. It is for anthropologists to decide whether the facts require it. I do not hesitate to say that if such a division can be used it enormously simplifies classification, and that this alone might be a sufficient reason for adopting it. Once we have abandoned the Linnæan dogma, "Species tot sunt quot diversas formas ab initio produxit Infinitum Ens," it is hard to see any philosophical justification for refusing to multiply species; there is nothing more and nothing less divine in the conception of species than in any other of the convenient processes of our thought. Sergi goes further than dividing into species, he now in this latest work feels himself obliged to admit *genera*. This is not for me at least a matter of cardinal importance. I do not forget that at least one great botanist of late years has advocated the abolition of *genera;* and I would regard the retention or abolition of the term as purely a matter of convenience. The degrees of distinction between different genera and between species and genus vary enormously as every naturalist knows, and there can be nothing preposterous in the suggestion that European, African and Asiatic man are as widely separated as some genera of plants and animals.

Proceeding then on a principle of classification which has the closest analogies in botany and zoology the author of "L'Uomo" divides mankind into five genera, of which two are extinct and three still exist. He names them in carefully chosen terminology:

Palæanthropus (including the several species of fossil man found in Europe).
Notanthropus (including all the species of African man).
Heoanthropus (Asiatic man).
Archæanthropus (including the two species of prehistoric man found in South America).
Hesperanthropus (the American Indian).

His book is devoted to the detailed description of each of these genera with their species, varieties and hybrids. Space forbids me to follow this treatment in detail, but I would recommend the reader carefully to study, among many other interesting points, the very original and somewhat audacious sections which deal with extinct man both in Europe and in South America.

D. Randall-MacIver.

GENERAL

Cuneiform Parallels to the Old Testament. Translated and Edited by Robert William Rogers. xxii and 470 pp. Ills., index. Eaton & Mains, New York, 1912. $4.50. 9 x 6.

This work comes to publication just forty years after Schrader's first edition of his comparison of the cuneiform inscriptions with various important passages of the Old Testament. Many of us yet recall the storm which burst about the head of the German Assyriologist, even such as perhaps refrained from the opinion that such work fell but little short of impiety and had the feeling that the foundations of the faith were shaken. How great a difference a few years have made, for this volume presents the largest possible instances whereby the temple libraries of the Euphrates valley have revealed a relation to the sacred books of the Jews which can be none other than that of source; yet this volume bears the imprint of publishers who stand almost as official in one of the largest of the evangelical churches. Prof. Rogers has rendered a double service in thus assembling all that is at present known upon this interesting theme. His translation gives a running narrative such as will wholly satisfy the general reader. The students of the cuneiform will find abundant material for their research in his careful transliteration of the original texts, a science in itself apart from the question of interpretation. The material covers the religious mythology of early Genesis and in a second period affords data whereby to elucidate the historical books when the Jews and the Babylonians were in conflict for the empire of western Asia. In the former we find the story of the creation and of the deluge, in the latter the campaigns of such familiar monarchs as Tiglath-pileser, Sennacherib, Nebuchadnezzar and Belshazzar. It simplifies the reading that Prof. Rogers in his translation has employed names made familiar through the Jewish scriptures. It would be difficult for the untrained to recognize the king who went out to grass under the designation of Na-bi-um-ku-dur-ri-u-su-ur.

William Churchill.

Scientific Method. Its Philosophy and its Practice. By F. W. Westaway. xix and 439 pp. Index. Blackie & Son, Ltd. London, 1912. 6s. 8x5½.

A discursive work in which the average man, at least, will not be able to see the woods for the trees. The treatment lacks continuity and coherency, as the author ranges from ancient times to modern, from philosophy to science and from problems of research to elementary teaching in the laboratories of botany and chemistry. It is not wholly apparent whether the volume is a sketch of the history of philosophy, a treatise on logic, a reading book of scientific classics, or a syllabus of high school science. The preface leaves the reader in doubt whether the author is more interested in promoting peace between the humanist and the realist, or in demonstrating that philosophy is the subject of all others which prepares the man of science for his task.

Book I, embracing somewhat more than one-third of the volume, is mainly a preliminary sketch of the personality and doctrines of leading philosophers, from Aristotle to Bacon, Descartes, Locke and Hume. The first chapter, however, deals with humanism versus realism, and the second chapter, on words and their elusiveness, has the flavor of a text-book of rhetoric. Book II is entitled "The Logic of Scientific Method." Here the author more nearly fulfills his intention to write for those "who feel interested in the methodical procedure of scientific investigations."

In Book III we find a series of discussions, extracted as examples of scientific method, from White of Selborne, Wallace, Darwin, Lord Avebury, Harvey, Priestley, Gay-Lussac, Newton, Faraday and others. The fourth book is on "Scientific Method in the Classroom." The author has attempted too much. The mature student will find many passages of interest, but the work would be a perplexing guide to a young investigator who desired to test the validity of his methods.

A. P. Brigham.

The Life of Sir Joseph Banks, President of the Royal Society, with Some Notices of his Friends and Contemporaries. By Edward Smith. Ills., index. John Lane, New York, 1911. $5. 25 cts. postage. 9 x 6.

There is far more in this biography than the tale of the young naturalist of Cook's first voyage, the memory of the mature owner of broad fields who did so much to improve the breed of fat sheep, the dictatorship of the Royal Society. At the beginning of the nineteenth century Banks was the mainspring of all the great scientific research in progress in England, and whithersoever Great Britain in the course of a generation of foreign wars was able to send her men of science. Born to a comfortable inheritance, Banks had never to fret about narrow affairs at home; whatsoever he wished to do he did, whatsoever he wished others to do he provided the means for the doing. For all of forty years there was not a single one of the great accomplishments of British science which did not owe its success to his support and to his zeal in the selection of the enthusiastic young men who might press onward to high discovery. In this narrative we read of his choice of Mungo Park to open the discovery of the Congo, of Nelson to sail with Bligh to collect the breadfruit of Tahiti for transplantation in the West Indies, of his discovery of Hooker in his brewery from which he emerged to become the director of Kew Garden and the great botanical authority of the world. To his home flowed a steady stream of all that was new and strange in the strange new lands then being added to the world's knowledge, and at his home congregated as at a museum all the students who wished to make use of the new material. There has long been a demand for a life of this great scholar and this sympathetic narrative will go far toward satisfying that demand.

William Churchill.

Missions: Their Rise and Development. By Louise Creighton. 256 pp. Index. In series: Home Univ. Library. Henry Holt & Co., New York, 1912. 50 cents. 7 x 4½.

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much of plain fact, and is so temperate in her statement of the accomplishments of missions, that her volume deserves to be read by those who are disposed to belittle missionaries and their work. A. P. BRIGHAM.

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NEW MAPS

EDITED BY THE ASSISTANT EDITOR

For system of listing maps see p. 75 of this volume

MAPS ISSUED BY UNITED STATES GOVERNMENT BUREAUS

U. S. GEOLOGICAL SURVEY

Topographic Sheets

(*Including Combined and Special Topographic Maps*)

LOUISIANA. (a) Milliken Bend Quadrangle. Surveyed in 1909. 1:31,680. 32°30′0″ - 32°22′30″ N.; 91°7′30″ - 91°0′0″ W. Contour interval 5 ft. Preliminary edition of Feb. 1913.

(b) Wilson Point Quad. Surveyed in 1909. 1:31,680. 33°0′0″ - 32°52′30″ N.; 91°7′30″ - 91°0′0″ W. Interval 5 ft. Preliminary edit. of Feb. 1913.

[Woods in green. Northern third of map (a) and eastern two-thirds of map (b), which cover portions of Mississippi, are blank.]

MAINE. Buckfield Quad. Surveyed in 1910–1911. 1:62,500. 44°30′ - 44° 15′ N.; 70°30′ - 70°15′ W. Interval 20 ft. Edit. of Feb. 1913.

[Woods in green.]

TEXAS. (a) Barnes Bridge Quad. Surveyed in 1910. 1:31,680. 32°52′30″ - 32°45′0″ N.; 96°35′0″ - 96°27′30″ W. Interval 5 ft. Edit. of Oct. 1912.

(b) Howth Quad. Surveyed in 1910. 1:31,680. 30°15′0″ - 30°7′30″ N.; 96°11′30″ - 96°4′0″ W. Interval 5 ft. Edit. of Feb. 1913.

[Woods in green on both sheets.]

Maps Accompanying Publications

ALASKA. (a) Reconnaissance Map of Headwater Region of Gulkana and Susitna Rivers, Alaska. Topography and triangulation by D. C. Witherspoon, C. E. Griffin, J. W. Bagley, and others. Surveyed in 1898, 1906, and 1910. 1:250,000. 63°40′ - 62°8′ N.; 149°42′ - 145°18′ W. 2 colors.

(b) Geologic Reconnaissance Map of Headwater Region of Gulkana and Susitna Rivers, Alaska. Geology by Fred. H. Moffit and Bertrand L. Johnson. Surveyed in 1910. 1:250,000. 63°40′ - 62°16′ N.; 147°45′ - 145°15′ W. 14 colors.

(c) Reprint (1912) of Part of Geologic Reconnaissance Map of the Central Copper River Region, Alaska. By W. C. Mendenhall. 1902. 1:250,000. 63°20′ - 62°30′ N.; 145°20′ - 144°0′ W. 10 colors.

Accompany, as Pls. I, II, and III, respectively, "Headwater Regions of Gulkana and Susitna Rivers, Alaska, etc." by F. H. Moffit, *Bull. 498*, 1912.

[Important original maps of the eastern end of the Alaska Range (if it is considered to be bounded on the east by the Delta River depression in 146° W.) and part of the Copper River Plateau to the south of it. Topography on map (a); relief in contours, interval 200 ft. Area surveyed included Mt. Hayes; altitude given as 13,940 ft. Map (c) is a reproduction of part of Pl. 12 of *Professional Paper No. 41*.]

ALASKA. (a) Topographic Map of Eagle River Region, Alaska. 1912. Topography by J. W. Bagley, C. E. Griffin, and R. E. Johnson. Surveyed in 1909–1910. 1:62,500. 58°48′ - 58°20′ N.; 135°2′ - 134°22′ W. 2 colors.

(b) Geologic map of Eagle River Region, Alaska. By Adolph Knopf. 1912. Surveyed in 1909–1910. Same scale and coordinates as map (a). 9 colors.

(c) Map of the Northern Portion of the Juneau Gold Belt, Alaska, Showing the Distribution of Ore Deposits with reference to the Geology. By Adolph Knopf. 1912. 1:250,000. 59°0′ - 58°8′ N.; 135°15′ - 134°0′ W. 7 colors.

Accompany, as Pls. I, II and V, respectively, "The Eagle River Region, Southeastern Alaska" by A. Knopf, *Bull. 502*, 1912.

[Region represented is the mainland portion of the fiord coast of Alaska from the central part of the eastern side of Lynn Canal to Taku Inlet, in a strip 5 to 8 miles wide. Relief in contours on maps (a) and (b): interval 50 ft.]

NORTH AMERICA

CANADA

QUEBEC. Map of Saint Augustine River, Province of Quebec, Canadian Labrador, Showing Explorations of Henry G. Bryant's Expedition, 1912. Russell W. Porter, Topographer. 1:721,372.2 [*sic*]. 53°40′ - 50°57′ N.; 60°13′ - 58°17′ W. 1 color. With inset showing location of main map. Accompanies "An Exploration in Southern Labrador" by H. G. Bryant, *Bull. Geogr. Soc. Philadelphia*, Vol. 11, 1913, No. 1, pp. 1–15.

[Valuable map of an original survey of one of the rivers of southeastern Labrador draining into the Gulf of St. Lawrence. Besides ascertaining that the divide between direct Atlantic and Gulf of St. Lawrence drainage lies 50 miles farther north than supposed (viz., in 52°38′ N. and 59°30′ W.), the survey showed that the

upper part of the St. Augustine River lies one degree farther west than shown, for instance, on the base map of Canada, 1:2,217,600, published by the Dept. of the Interior, Ottawa, 1912.]

QUEBEC. Sketch Map of the Saint Augustine River showing explorations of Henry G. Bryant's Expedition, 1912. Russell W. Porter, Topographer. 1:1,500,000. 53⅝° - 51° N.; 60½° - 58° W. With inset, 1:35,000,000, showing location of main map. Accompanies, on p. 341, "An Expedition in South-Eastern Labrador" by H. G. Bryant, *Geogr. Journ.*, Vol. 41, 1913, No. 4, pp. 340-346.

[Based on the map listed immediately above.]

WESTERN CANADA (MANITOBA, SASKATCHEWAN, ALBERTA, BRITISH COLUMBIA). Sectional Map [of Western Canada]. 1:190,080. [Topographical Surveys Branch, Dept. of the Interior, Ottawa.] [53 sheets, enumerated in meridional strips, proceeding from west to east. Name and number of each sheet as on original. Each sheet covers 42′ in latitude and approximately 2° in longitude. No geographical coordinates are given, the map being based on the system of range and township lines. As the range lines coincide with parallels of latitude the north and south limits of each sheet can be defined in terms of geographical coordinates; as the township lines, however, coincide only with every fourth meridian (122°, 118°, 114° W., etc.) the east or west limit of a sheet can only be defined accurately when it coincides with one of these meridians. See the "Index [map] to Sectional Maps showing names of the sheets and their numbers," 1:2,217,600, Surveyor General's Office, Ottawa.]

Strip between 122° and 120° W. No. 111: Kamloops, B. C., sheet. 51°6′ - 50°24′ N. Revised to the 14th May, 1912.

Between 120° and 118° W. 462: Dunvegan, Alta. 56°0′ - 55°18′ N. Nov. 22, 1911. 412: Wapiti, Alta. 55°18′ - 54°36′ N. Jan. 10, 1912. 112: Sicamous, B. C. 51°6′ - 50°24′ N. Feb. 28, 1912.

Between 118° and approx. 116° W. 313: Brulé, Alta. 53°54′ - 53°12′ N. Sept. 23, 1911. 213: Athabasca, Alta. (and B. C.). 52°30′ - 51°48′ N. Nov. 2, 1911. 163: Donald (B. C. and Alta.). 51°48′ - 51°6′ N. Jan. 14, 1911.

Between 116° approx. and 114° W. 264: Brazeau, Alta. 53°12′ - 52°30′ N. Jan. 30, 1912. 214: Rocky Mountain House (Alta.). 52°30′ - 51°48′ N. Jan. 26, 1911. 114: Calgary, Alta. and B. C. 51°6′ - 50°24′ N. Sept. 25, 1912. 64: Porcupine, Alta. and B. C. 50°24′ - 49°42′. Jan. 29, 1912.

Between 114° and approx. 112° W. 315: Edmonton, Alta. 53°54′ - 53°12′ N. Dec. 12, 1911. 165: Rosebud, Alta. 51°48′ - 51°6′ N. Nov. 27, 1911. 65: Macleod (Alta.). 50°24′ - 49°12′ N. July 28, 1911.

Between 112° approx. and 110° W. 366: Saddle Lake, Alta. 54°36′ - 53°54′ N. Feb. 15, 1912. 316: Vermilion, Alta. 53°54′ - 53°12′ N. Jan. 18, 1912. 266: Ribstone Creek, Alta. 53°12′ - 52°30′ N. Oct. 23, 1911. 216: Sullivan Lake. 52°30′ - 51°48′ N. Oct. 16, 1911. 116: Rainy Hills, Alta. 51°6′ - 50°24′ N. March 5, 1912. 16: Milk River, Alta. 49°42′ - 49°0′ N. June 6, 1912.

Between 110° and approx. 108° W. 317: Fort Pitt, Sask. 53°54′ - 53°12′ N. July 8, 1912. 217: Tramping Lake, Sask. 52°30′ - 51°48′ W. April 30, 1912. 167: Bad Hills, Sask. 51°48′ - 51°6′ W. April 30, 1912. 67: Maple Creek, Sask. 50°24′ - 49°42′ N. Mar. 20, 1912. 17: Cypress (Sask.). 49°42′ - 49°0′ N. Feb. 28, 1912.

Between 108° approx. and 106° W. 318: Sheel River (Sask.). 53°54′ - 53°12′ N. June 20, 1911. 268: Carlton, Sask. 53°12′ - 52°30′ N. Aug. 19, 1912. 68: Swift Current (Sask.). 50°24′ - 49°42′ N. Aug. 15, 1911. 18: Wood Mountain (Sask.). 49°42′ - 49°0′ N. May 31, 1911.

Between 106° and approx. 104° W. 319: Prince Albert, North (Sask.). 53°54′ - 53°12′ N. July 20, 1911. 269: Prince Albert, South (Sask.). 53°12′ - 52°30′ N. July 12, 1911. 169: Touchwood, Sask. 51°48′ - 51°6′ N. May 23, 1912. 119: Regina (Sask.). 51°6′ - 50°24′ N. Jan. 23, 1911. 19: Willowbunch, Sask. 49°42′ - 49°0′ N. Feb. 26, 1912.

Between 104° approx. and 102° W. 320: Carrot River (Sask.). 53°54′ - 53°12′ N. May 16, 1911. 270: Pasquia (Sask.). 53°12′ - 52°30′ N. March 24, 1911. 170: Yorkton (Sask.). 51°48′ - 51°6′ N. Feb. 27, 1911. 120: Qu' Appelle (Sask.). 51°6′ - 50°24′ N. Sept. 11, 1911. 20: Souris, Sask. 49°42′ - 49°0′ N. Feb. 9, 1912.

Between 102° and approx. 100° W. 271: Mossy Portage (Man. and Sask.). 53°12′ - 52°30′ N. June 15, 1911. 221: Swan River (Man. and Sask.). 52°30′ -

51°48′ N. June 12, 1911. 121: Riding Mountain (Man. and Sask.). 51°6′ - 50°24′ N. March 13, 1911. 71: Brandon (Man. and Sask.). 50°24′ - 49°42′ N. April 18, 1911. 21: Turtle Mountain (Man. and Sask.). 49°42′ - 49°0′ N. Feb. 13, 1911.

Between 100° approx. and 98° W. 222: Waterhen, Man. 52°30′ - 51°48′ N. May 10, 1912. 172: Fairford (Man.). 51°48′ - 51°6′ N. March 15, 1911. 122: Manitoba House (Man.). 51°6′ - 50°24′ N. March 24, 1911. 72: Portage la Prairie (Man.). 50°24′ - 49°42′ N. May 3, 1911. 22: Dufferin, Man. 49°42′ - 49°0′ N. Nov. 15, 1911.

Between 98° and approx. 96° N. 173: Washow (Man.). 51°48′ - 51°6′ N. Sept. 12, 1911. 123: Fort Alexander (Man.). 51°6′ - 50°24′ N. June 2, 1911. 23: Emerson (Man.). 49°42′ - 49°0′ N. April 30, 1911.

Between 96° approx. and 94° W. 74: Cross Lake, Man. and Ont. 50°24′ - 49° 42′ N. June 7, 1912. 24: Lake of the Woods, Man. and Ont. (and Minn.). 49°42′ - 49°0′ N. March 7, 1912.

[The greater geographical value of the work done by the Canadian Topographical Surveys Branch of the Dept. of the Interior as compared with the work of our General Land Office—to which institution it most closely corresponds—is well exemplified by this map. Although the surveys made by the two organizations are of the same kind and have the same object, in the case of the Canadian organization they are made readily accessible in the form of this map on a relatively large scale, while the General Land Office publishes no comparable map. Copies of its township plots are available on the scale of 1:31,680 and, indirectly, in the relatively inaccessible blue-print maps prepared by the railroad companies that have had access to them when filing their claims for right of way for new lines; otherwise the surveys of the General Land Office are practically only accessible on the comparatively small-scale (1:760,320) maps of the 29 present or former public land states. Another valuable feature of the Sectional Map is that it represents relief (simplified hachuring is used). This is all the more creditable, as the function of land surveys is often conceived to be restricted to two-dimensional values. Finally, not the least value of the map lies in the fact that it includes regions which are not covered in detail by the Geological Survey of Canada or any other survey and thus often affords the only available large-scale delineation of certain regions.]

United States

California. Map of the Southern Portion of California Showing the Saline Deposits and the Desert Sections of the State together with the Location of Springs and Wells. [1:656,000.] [36⅝° - 32½° N.; 119½° - 114° W.] 1 color. California State Mining Bureau, San Francisco, August 1905.

[Salt basins and salt lakes colored red. Symbols for deposits of borax, salt, soda, and niter. Relief indicated by generalized contours.]

AFRICA

German East Africa. Karte von Ufipa zur Darstellung der Routenaufnahmen des Hauptm. a. D. Fromm (1908–1909). Auf Grundlage des von P. Sprigade u. M. Moisel bearbeiteten Grossen Deutschen Kolonialatlasses (Blatt 19 u. 22) gezeichnet von C. Jurisch. 1:1,000,000. 6°25′ - 9°25′ S.; 30°5′ - 32°53′ E. 4 colors. Accompanies, as Karte 6, "Ufipa: Land und Leute. Ergebnisse einer in den Jahren 1908 und 1909 ausgeführten Forschungsreise" by P. Fromm, *Mitt. aus den Deutschen Schutzgeb.*, Vol. 25, 1912, No. 2, pp. 79–102.

[Ufipa is the highland enclosed between the southern end of Lake Tanganyika and the Rukwa rift depression. Relief in approximate contours, author's route in red.]

Kamerun. Vegetationskarte der von dem Botaniker Ledermann durchreisten Gebiete Kameruns. Nach der von M. Moisel bearbeiteten Karte von Kamerun des "Grossen Deutschen Kolonialatlas" gezeichnet von W. Rux. 1:1,000,000. 9°25′ - 2°5′ N.; 9°5′ - 14°20′ E. 18 colors. Accompanies, as Karte 3, "Eine botanische Wanderung nach Deutsch-Adamaua" by C. Ledermann, *Mitt. aus den Deutschen Schutzgeb.*, Vol. 25, 1912, No. 1, pp. 20–55.

[The mapping of the botanical features is restricted to a strip 15 to 20 miles wide stretching northeast from Kamerun Mountain to Garua on the upper

Benue. Sixteen plant formations are distinguished, similar symbols being used as on Engler's vegetational map of Kamerun in Vol. I of "Das deutsche Kolonialreich," edited by Hans Meyer.]

KAMERUN. Der Nordrand des Kamerun-Plateaus. Nach älteren berichtigten und noch unveröffentlichten Aufnahmen des Hauptm. Strümpell bearbeitet von M. Moisel. 1:1,000,000. 8°42′ - 7°13′ N.; 12°11′ - 14°12′ E. 2 colors. Accompanies, as Karte 1, "Forschungen am Nordrande des Kamerunplateaus" by K. Strümpell, *Mitt. aus den Deutschen Schutzgeb.*, Vol. 25, 1912, No. 1, pp. 1–18.

[The relevant part of Sheets Nos. 5 and 6 of the Grosser Deutscher Kolonialatlas with appropriate corrections. Relief in approximate contours.]

MOROCCO. Région sud et est de Mogador d'après la carte du Service cartographique de Casablanca. [1:530,000]. [31°36′ - 31°3′ N.; 9°58′ - 9°13′ W.]. Accompanies, on p. 70, "L'Oeuvre Française au Maroc," *L'Afrique Franç.*, Vol. 23, 1913, No. 2, pp. 69–78.

ASIA

CHINA. Dr. Albert Tafels Reise in China und Tibet 1905–1908. [Sheet No. —.] 1:200,000. 37°30′ - 36°40′ N.; 104°20′ - 105°0′ E. 2 colors. Accompanies, as Taf. 2, "Das Kartenwerk: Dr. Albert Tafel, Reisen in China und Tibet" by A. Penck, *Zeitschr. Gesell. für Erdk. zu Berlin*, 1913, No. 2, pp. 81–84.

[Sample sheet of the important atlas of 31 sheets, just published, embodying Dr. Tafel's route surveys in China. The present sheet embraces part of the course of the Hoang-ho in Kansu. Relief in approximate contours (interval 50 meters) and shading.]

MONGOLIA-SIBERIA. (a) The Basin of the Upper Yenisei and surrounding regions. By Douglas Carruthers. 1:2,000,000. 54°0′ - 48°55′ N.; 88°40′ - 100°25′ E. 3 colors.

(b) The Karlik Tagh and Barkul Mountains. From a plane table survey by Douglas Carruthers with material added from Sheet XXI of the map of the "Southern Frontier Regions of Asiatic Russia" and from Sir Aurel Stein's surveys of 1906–8. 1:500,000. 44°2′ - 42°43′ N.; 90°35′ - 95°15′ E. 5 colors. With inset, 1:60,000,000, showing location of main map.

Accompany "Notes on the Maps Illustrating the Exploration in Mongolia and Dzungaria" by D. W. Carruthers, *Geogr. Journ.*, Vol. 41, 1913, No. 4, pp. 346–349.

[Important maps embodying all previous knowledge, supplemented by the author's own surveys. On map (a), which includes mainly the region about the bend of the Sayan Mts. ("Syansk Mts." on the map), relief in brown shading, drainage in blue, author's route in red; on map (b), which represents the easternmost end of the Tian Shan, relief in approximate contours (interval 500 ft.) and shading in brown, perpetual snow in gray-blue, glaciers in blue. The limits of these two maps were shown on the general map of Mongolia and Dzungaria by the same author, listed under "Chinese Empire" (second entry) in the *Bull.*, Vol. 44, 1912, p. 638.]

AUSTRALASIA AND OCEANIA

KAISER-WILHELMSLAND. (a) Vorläufige Skizze der bisherigen Aufnahmen des Dr. Behrmann im Mittellauf des Kaiserin-Augustaflusses. 1:750,000. [4°0′ - 4°40′ S.; 141°25′ - 143°0′ E.]

(b) Vorläufige Skizze des Vorstosses von Dr. Behrmann vom Kaiserin-Augustafluss zum Zentral-Gebirge. 1:750,000. [4°10′ - 5°0′ S.; 142°5′ - 142°50′ E.]

Accompany, as Figs. 14 and 15 on pp. 140 and 143, "Nachrichten von der deutschen Neuguinea-Expedition: III," *Zeitschr. Gesell. für Erdk. zu Berlin*, 1913, No. 2, pp. 138–145.

[Important maps, especially map (b), of the new explorations of the German New Guinea Expedition. Map (b) represents an advance to the summit of the dividing range. This map is also reproduced in *Deutsches Kolonialblatt*, Vol. 24, 1913, No. 6, p. 276. Relief on both maps in approximate contours.]

EUROPE

BALKAN PENINSULA. Die Grenzen des neuen albanischen Staates nach den verschiedenen Vorschlägen. 1:1,500,000. 43⅞° - 38⅝° N.; 18½° - 22° E. 7 colors.

Accompanies, as Taf. 33, "Der neue albanische Staat und seine Grenzen" by A. Baldacci, *Pet. Mitt.*, Vol. 59, I, pp. 221–222.

[Shows, in red, the boundary (1) claimed by the Albanian provisional government, (2) suggested by Austria-Hungary, (3) suggested by Russia, France and England. Symbols indicate the seats of the bishoprics and archbishoprics of the various confessions.]

BALKAN PENINSULA. Königreich Bulgarien und die zentralen Balkanländer zwischen Adria u. Pontus. Auf Grundlage der Scheda'schen Karte, II. Ausgabe. Bearbeitet von Dr. Karl Peucker. III. Erweiterte Ausgabe, 1913. Grenzansprüche der Balkanstaaten: Nach Originalmaterialien zusammengestellt. 1:864,000. 44°15′ - 39°32′ N.; 18°20′ - 30°40′ E. 8 colors. With separate southwestern continuation of main map on same scale. 39°32′ - 38°15′ N.; 19°20′ - 21°20′ E. 3 colors. Artaria & Co., Vienna. Feb., 1913.

[The base, which is the same as that of the map listed under "Balkan Peninsula" in the *Bull.* for April (p. 320) is of permanent value because of its detail. The boundaries showing separately the claims and the pretensions (*Ansprüche* and *Anwartschaften*) of the Balkan states for territory after the close of the war are only of temporary interest.]

POLAR

GREENLAND. Map Showing the Route of Capt. Ejnar Mikkelsen's Expedition, 1909–1912. [1:2,000,000]. 83⅔° - 74½° N.; 38° W. - 0°. 1 color. Accompanies "Lost in the Arctic" by E. Mikkelsen, New York, 1913.

[Important map adding details to the survey of northeastern Greenland by Mylius Erichsen in 1907–8. The non-existence of Peary Channel is shown, in keeping with records found from the Erichsen Expedition, and considerable new topography has been added inland west of Germania Land in 77° W.]

GREENLAND. Sketch Map to illustrate Einar Mikkelsen's Expedition to North East Greenland, 1909–12. Based upon the map of the Danish North East Greenland Expedition, 1906–8, with corrections from sketches supplied by Einar Mikkelsen. 1:4,000,000. 83⅔° - 73½° N.; 40° W. - 8° E. 1 color. With inset, 1:40,000,000, showing location of main map. 1 color. Accompanies "Expedition to North-East Greenland, 1909–12," by E. Mikkelsen, *Geogr. Journ.*, Vol. 41, 1913, No. 4, pp. 313–324.

[Based on the preceding map.]

ANTARCTIC. (a) Reiseweg und Lotungen der Deutschen Antarktischen Expedition im Weddellmeer 1911/12. [1:14,000,000]. 53° - 79° S.; 80° W. - 0°.

(b) Trift der "Deutschland" im Packeis des Weddellmeeres, 1912. [1:2,800,000]. 63° - 74° S.; 46° - 31° W.

Accompany, as Taf. 3 and 4, "Ozeanographische Arbeiten der Deutschen Antarktischen Expedition (Die Eisfahrt)" by W. Brennecke, *Ann. der Hydrogr.*, Vol. 41, 1913, No. 3, pp. 134–144.

[Map (a) shows the isobaths of the Weddell Sea, deduced from the soundings of the German Antarctic Expedition and Bruce's previous work; map (b) shows the course of the *Deutschland* during her drift. Cf. also the maps listed under "Antarctic" (second entry) in the *Bull.*, Vol. 45, 1913, No. 5, p. 399.]

WORLD AND LARGER PARTS

SOUTH ATLANTIC OCEAN. (a) Die unterseeische Talrinne des Kongo. [Mean meridional scale, 1:1,750,000]. 5°23′ - 6°25′ S.; 10°28′ - 12°35′ E.

(b) Der nordöstliche Teil des Walfisch-Rückens. [1:16,000,000.] 15° - 30° S.; 5° - 18° E.

Accompany, as Figs. 4 and 5 on pp. 11 and 13 respectively, "Wissenschaftliche Forschungen auf der Ausreise S. M. S. 'Möwe' nach Süd-Westafrika im Jahre 1911, etc." by Capt. Schlenzka, *Ann. der Hydrogr.*, Vol. 41, 1913, No. 1, pp. 1–20.

[Map (a) fills in the gap hitherto existing in our knowledge of the form of the submarine valley of the Congo about 30 miles from the coast. Map (b) includes new soundings at the 'neck' of the Walfisch Rise, defining its connection with the continental land mass of Africa.]